RECLAMATION

Managing Water in the West

SACRAMENTO SUBURBAN WATER DISTRICT LONG-TERM WARREN ACT CONTRACT ENVIRONMENTAL ASSESSMENT

PREPARED FOR:

SACRAMENTO SUBURBAN WATER DISTRICT

CLEARLY REFRESHING SERVICE!

PREPARED BY:

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

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UNITED STATES OF AMERICA AND SACRAMENTO SUBURBAN WATER DISTRICT LONG-TERM WARREN ACT CONTRACT ENVIRONMENTAL ASSESSMENT

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AF	acre-feet
AFA	acre-feet annually
AFRP	Anadromous Fish Restoration Program
APE	Area of Potential Effects
ARBCA	American River Basin Cooperating Agencies
AROG	American River Operations Group
ASR	aquifer-storage-recovery
BA	Biological Assessment
BMPs	best management practices
BO	Biological Opinion
Cal-Am	Cal-American Water Company
CAR	Fish and Wildlife Coordination Act Report
CDFG	California Department of Fish and Game
CDPR	California Department of Parks and Recreation
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CI	commercial and industrial
CII	Commercial, industrial, and institutional
CNDDB	California Natural Diversity Data Base
COA	Coordinated Operations Agreement
Corps	U.S. Army Corps of Engineers
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
D-1641	State Water Resources Control Board Decision 1641
D-893	State Water Resources Control Board Decision 893
Delta	Sacramento-San Joaquin Delta
DERA	Sacramento County Department of Environmental Review
DMMs	Demand Management Measures
DOE	Department of Energy
Dry Creek CRMP	Dry Creek Coordinated Resource Management Plan
DWR	Department of Water Resources
EA	Environmental Assessment
EC	Economic Criterion
EFH	essential fish habitat
EID	El Dorado Irrigation District
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ENVC	Environmental Criterion
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended

ESU	Evolutionarily Significant Unit
E/TC	Efficacy and Timing Criterion
EWA	Environmental Water Account
Fairbairn WTP	E.A. Fairbairn Water Treatment Plant
FISH Plan	Water Forum Fish and In-Stream Habitat Plan
FMS	Flow Management Standard
FONSI	finding of no significant impact
FRWA	Freeport Regional Water Authority
FWCA	Fish and Wildlife Coordination Act
HCP	Habitat Conservation Plan
HME	Habitat Management Element
I-80	Interstate 80
IC	Institutional Criterion
Interior	Department of Interior
ITAs	Indian Trusts Assets
kW	kilowatts
kWh	kilowatt hours
M&I	municipal and industrial
McClellan	McClellan Air Force Base
MFP	Middle Fork Project
mgd	million gallons per day
MMRP	Mitigation, Monitoring, and Reporting Plan
MOU	Memorandum of Understanding
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
msl	mean sea level
MWh	megawatt hours
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NID	Nevada Irrigation District
NMFS	National Marine Fisheries Service
Northridge	Northridge Water District
NRHP	National Register of Historic Places
OC	Operational Criterion
OCAP	Operations Criteria and Plan
Parkway	American River Parkway
PCWA	Placer County Water Agency
Peterson WTP	Sydney N. Peterson Water Treatment Plant
PG&E	Pacific Gas and Electric Company
PHC	Public Health Criterion

RC	Reliability Criterion
RCMP	River Corridor Management Plan
Reclamation	U.S. Bureau of Reclamation
RM	river mile
ROD	Record of Decision
RWA	Regional Water Authority
RWQCB	Regional Water Quality Control Board
Sacramento River WTP	Sacramento River Water Treatment Plant
SAWWA	Sacramento Area Water Works Association
SGA	Sacramento Groundwater Authority
SJWD	San Juan Water District
SMUD	Sacramento Municipal Utility District
SRA	State Recreation Area
SSWD	Sacramento Suburban Water District
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWRI	Surface Water Resources, Inc.
TAF	thousand acre-feet
T/PC	Technical and Physical Criterion
ULF	ultra-low flush
USFWS	U.S. Fish and Wildlife Service
VELB	Valley Elderberry Longhorn Beetle
VSP	Viable Salmonid Population
WA	Warren Act
Western	Western Area Power Administration
WTP	water treatment plant
YCWA	Yuba County Water Agency

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1.0 INTRODUCTION

The U.S. Bureau of Reclamation (Reclamation) proposes to enter into a long-term (25-year) Warren Act (WA) contract with Sacramento Suburban Water District (SSWD). This contract is for the conveyance of up to 29,000 acre-feet annually (AFA) of Placer County Water Agency (PCWA) Middle Fork Project (MFP) water through Folsom Reservoir and the federal facilities at Folsom Dam. Water conveyed through Folsom Dam under this action would be treated at and distributed from the Sydney N. Peterson Water Treatment Plant (Peterson WTP) facilities, owned and operated by San Juan Water District (SJWD). The water ultimately would be used within the SSWD long-term WA service area in north-central Sacramento County, which includes the former Northridge service area, the former Arcade service area (North Highlands system), and McClellan Business Park (formerly McClellan Air Force Base [McClellan]) within the SSWD North service area, as well as adjacent water purveyor service areas. The SSWD was organized on February 1, 2002 through the consolidation of two water districts: Northridge Water District and Arcade Water District.

1.1 STATEMENT OF PURPOSE AND NEED

The purpose and need for the project is to reduce reliance on groundwater resources within southwestern Placer County and the SSWD service area through a substitute surface water supply provided by PCWA, as available. Reductions in groundwater pumping by SSWD and other adjacent water purveyors would help contribute to stabilization of the regional groundwater aquifer. The project is a key element in ongoing regional efforts to protect water resources and ensure the efficient conjunctive use of regional surface and groundwater supplies, as identified by the Sacramento Groundwater Authority (SGA) Groundwater Management Plan (SGA 2003) and the American River Basin Cooperating Agencies (ARBCA) Regional Water Master Plan Final Report (MWH 2003).

The purpose of executing a long-term WA contract with SSWD is to allow for the conveyance through Folsom Reservoir of up to 29,000 AFA of water rights water purchased from the PCWA MFP. The SSWD long-term WA service area is within PCWA's authorized place of use and constitutes efficient in-basin utilization of PCWA's water rights water by SSWD and other adjacent water purveyors within the SSWD long-term WA service area. A new long-term WA contract would provide SSWD and others with the operational flexibility to better meet their existing and future water demands through a combination of Central Valley Project (CVP) and non-CVP surface water supply deliveries, resulting in reduced reliance on groundwater withdrawals to provide water supplies within northern Sacramento County.

To facilitate the maximum benefit from the available surface water and to maximize efficient regional water resource management, SSWD may share a portion of its purchased PCWA water rights water with adjacent purveyors when it is available. As a project that has regional implications in its efforts to stabilize the groundwater aquifer, surface water deliveries to any adjacent purveyor who, in turn would reduce their dependence on groundwater, would have

the effect of helping stabilize the regional groundwater aquifer. A limited amount of this surface water supply, therefore, could be made available to portions of the Cal-American Water Company (Cal-Am) service area in northern Sacramento County. However, sharing a portion of the purchased PCWA water rights water with adjacent purveyors would be contingent upon available water treatment plant capacity. At this time no definitive program or shared arrangement has been established. The portions of the SSWD and Cal-Am service areas where long-term WA water may be provided (i.e., the long-term WA service area), as well as adjacent water utilities, are illustrated on **Figure 1-1**.

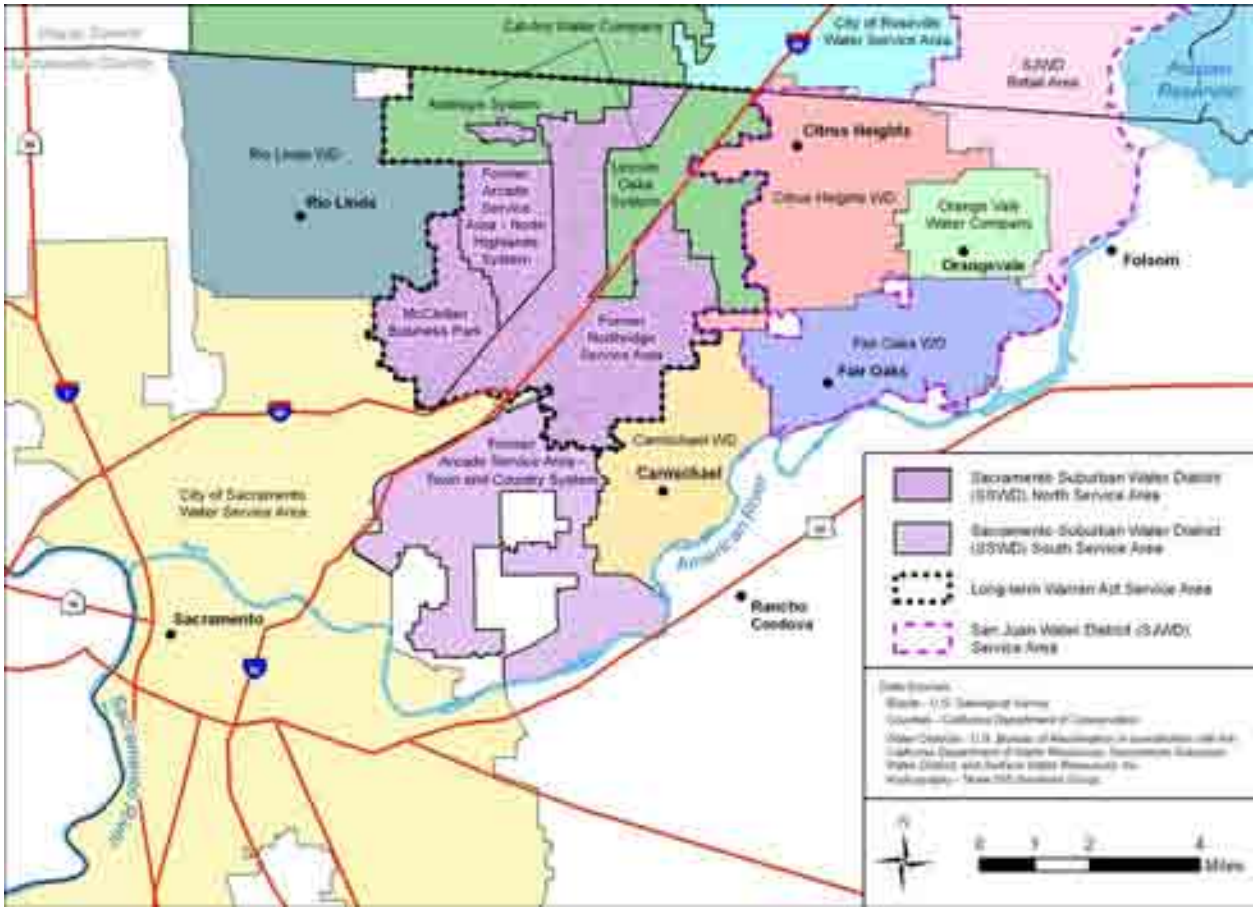

Figure 1-1. SSWD long-term WA service area.

1.1.1 Groundwater Supplies

Recent groundwater investigations confirm that continued pumping of groundwater in northern Sacramento County and southwestern Placer County at current and projected future pumping rates would exacerbate overdraft of the underlying aquifer. The former Northridge Water District conducted groundwater-modeling studies to evaluate the impacts of conjunctive use of surface water and groundwater on the North American River Groundwater Basin. The modeling results have shown that, without any additional surface water deliveries to northern Sacramento County, the cone of depression currently centered beneath McClellan Business Park would increase in depth by about 10 to 20 feet, shifting northeasterly towards Placer County. Furthermore, groundwater levels in northern Sacramento County and southwestern Placer County would decline, relative to current conditions. Without a substantial reduction in the use of this aquifer, dewatering at its eastern fringe within northeastern Sacramento County and in

the west Roseville and Lincoln areas of Placer County is likely to result (PCWA and NWD 1998).

Declining groundwater levels in northern Sacramento County and southwestern Placer County have been under investigation for some time and have resulted in initiatives set out to determine how best to alleviate the current groundwater overdraft. Groundwater levels along the Placer/Sacramento county line west of the City of Roseville continue to decline at a rate of one and one-half feet per year (PCWA and NWD 1998). Curtailment of current and future demands on this aquifer are required in order to avoid further depletion as well as related adverse impacts associated with existing groundwater degradation and a lowered water table, including increased risks of land subsidence, increased groundwater pumping (and wellhead treatment) costs, and the ultimate risk of some existing wells going dry.

The current containment and remediation program of the United States Department of the Air Force is intended to prevent the existing contaminated plume beneath McClellan and the Southern Pacific rail yard from migrating as groundwater withdrawals continue within the area of the cone of depression (PCWA and NWD 1998). In recognition of the uncertainties regarding the effectiveness of the remediation plan due to potential future changes in regional hydrogeologic conditions, specifically, changes in groundwater elevations and flow direction, a range of contingency measures have been identified as part of the Groundwater Operable Unit Final Remedial Investigation/Feasibility Study for McClellan Air Force Base. The Department of the Air Force is, and would continue to be, responsible for any required modifications to its remediation system to address changing hydrogeologic conditions.

The proposed project is separate from and unassociated with the ongoing containment and remediation program at McClellan. While the proposed project is intended to provide McClellan with a surface water supply, McClellan's remediation efforts are part of the region's U.S. Environmental Protection Agency (EPA) Superfund projects and are directed toward clean up of contaminated groundwater.

In addition to the recognized need to stabilize groundwater in the project area, a 1993 Sacramento County Water Policy requires that groundwater overdraft be eliminated no later than 2000. As a result, PCWA and the former Northridge Water District, in cooperation with SJWD and the City of Roseville, initiated actions to implement a long-term groundwater stabilization project. When implemented, the groundwater stabilization project would contribute to the prevention of further groundwater lowering in the region by replacing the use of up to 29,000 AFA of groundwater with available surface water supplies. Surface water supplies were to be used primarily by the former Northridge Water District and McClellan for municipal and industrial (M&I) purposes. The Groundwater Stabilization Project Draft Environmental Impact Report (EIR) was issued by PCWA and Northridge Water District in October 1998, and the Final EIR was issued in February 1999. These environmental documents analyzed a total of up to 29,000 AFA of surface water to be purchased from PCWA and supplied to the former Northridge Water District. The proposed project will implement the Groundwater Stabilization Project by allowing long-term delivery of surface water from PCWA to northeastern Sacramento County (i.e., the SSWD long-term WA service area), thereby reducing the area's reliance on groundwater pumping and contributing to stabilization of the regional groundwater aquifer.

1.1.2 Water Supply Needs

Based on the 1991 Northridge Water Master Plan (NWD 1991), water demands within the former Northridge Water District were projected to increase to 23,971 AFA by 2010 and to 25,091 AFA by 2023 (PCWA and NWD 1998). The relatively small increase between 2010 and 2023 acknowledges that the former Northridge service area would be essentially developed by 2010. If demand were to continue at its present rate, a demand of 26,000 AFA could be reached by 2030. This, coupled with an additional 3,000 AFA to serve McClellan, would bring water demand within this area to 29,000 AFA by the year 2030. These demand forecasts are based on the assumption that SSWD will continue its water conservation efforts consistent with the commitments defined by the Sacramento Area Water Forum (see the subsection entitled Water Forum Purveyor-Specific Agreement Best Management Practices at the end of Chapter 1) (PCWA and NWD 1998). In addition, based on Sacramento County General Plan land use, projected water demand within the former Arcade service area (North Highlands system) at buildout is 5,640 AFA (Arcade Water District 1995).

Water demands within much of northern Sacramento County and southwestern Placer County have historically been met with an increasing reliance on groundwater. As indicated in **Table 1-1**, between 1991 and 1999 the former Northridge Water District pumped an average of approximately 13,837 AFA, representing over 80 percent of its water supply. In 1991, the former Northridge Water District began using surface water in limited quantities. Surface water supplied to the Northridge service area since 1991 has included a short-term transfer from Nevada Irrigation District (NID), surplus (Section 215) CVP water from Reclamation, and surplus water received from SJWD on an as-available basis (**Table 1-2**). In 1998, the former Northridge Water District's surface water supply was significantly increased, representing almost 70 percent of their water supply for that year. All of this surface water, however, was surplus Section 215 water made available by Reclamation. SSWD is eligible to purchase surplus Section 215 water in average water years (SSWD 2003).

The SSWD North service area began receiving surface water from PCWA's MFP in June 2000, under an agreement to provide delivery of up to 29,000 AFA. The agreement increases the quantity of surface water available to SSWD from 7,000 AFA in the year 2000 to 29,000 AFA in the fifteenth year. The 29,000 AF annual water supply is then maintained through the 25th year of the agreement. The term of this agreement is subject to extension. Purchased PCWA surface water has been delivered to SSWD under one-year WA contracts with Reclamation in 2000 through the current year (2006), however this water is not available to SSWD in dry water years (SSWD 2003).

The surface water supply to SSWD is subject to significant reductions during dry years (seasonal and climatic shortages). Because surplus Section 215 water and PCWA water are assumed to not be available in dry years, the only other source of water for the SSWD North service area is groundwater (SSWD 2003). Facilitating the delivery of a substantial surface water supply to SSWD would result in greater conjunctive use opportunities, operational flexibility, and reliability in meeting current and anticipated water needs. As stated above, SSWD intends to provide long-term WA water to McClellan Business Park and could also provide water to portions of Cal-Am's service area. Both of these areas currently rely on groundwater supplies.

Table 1-1. Historical water usage within the SSWD North service area.

Year	Groundwater (AFA)	Surface Water[1] (AFA)	Surface Water/Total Supply (%)	Total (AFA)
1991	15,632	90	1	15,722
1992	14,147	1,700	11	15,847
1993	13,046	2,037	14	15,083
1994	16,028	1,855	10	17,883
1995	15,476	1,954	11	17,430
1996	16,965	1,502	8	18,467
1997	16,992	1,089	6	18,081
1998	5,002	12,145	71	17,147
1999	11,248	8,573	43	19,821
2000	7,099	14,982	68	22,087
2001	7,034	15,483	69	22,517
2002	5,446	16,775	76	22,221
2003	6,871	15,340	69	22,211
2004	8,226	15,418	65	23,644
2005	5,681	14,357	72	20,038

[1] Surface water use began in December 1991
Source: (SSWD 2003), (Jung, pers. comm. 2005), and (Jung, pers. comm. 2006)

Table 1-2. Surface water received within the SSWD North service area.

Year	NID[1] (AFA)	SJWD Surplus (AFA)	Section 215 (AFA)	PCWA (AFA)	Total (AFA)
1991	90	0	0	0	90
1992	1,700	0	0	0	1,700
1993	1,298	739	0	0	2,037
1994	0	1,855	0	0	1,855
1995	0	754	1,200	0	1,954
1996	0	586	916	0	1,502
1997	0	411	678	0	1,089
1998	0	0	12,145	0	12,145
1999	0	0	8,573	0	8,573
2000	0	0	4,955	10,027	14,982
2001	0	0	0	15,483	15,483
2002	0	0	0	16,775	16,775
2003	0	0	1,797	13,543	15,340
2004	0	0	0	15,418	15,418
2005	0	0	0	14,357	14,357

[1] In 1991, the former Northridge Water District entered into an agreement with NID for the transfer of up to 5,000 AFA from Folsom Reservoir for treatment and conveyance by SJWD
Source: (SSWD 2003), (Jung, pers. comm. 2005), and (Jung, pers. comm. 2006)

While SSWD intends to use surface water purchased from PCWA to replace current groundwater pumping, there may be an opportunity for use of some of the surface water for direct groundwater recharge. Groundwater recharge may be accomplished using three existing SSWD wells that also have been outfitted to function as injection wells. In addition, expanded

opportunities for direct recharge may be available in the future. As part of the Regional Water Master Plan, several water purveyors are currently investigating aquifer-storage-recovery (ASR) technology and feasibility. A conjunctive use program is being developed as part of this plan designed to facilitate groundwater banking, including the establishment of a crediting and withdrawal system. Water pricing and overall availability will be significant determining factors in the implementation of the Regional Water Master Plan.

1.2 PURPOSE OF THIS ENVIRONMENTAL ASSESSMENT

The purpose of this document is twofold. First, it meets Reclamation's impact assessment obligations under the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq*.). NEPA requires full disclosure regarding potential federal actions, their alternatives, potential impacts, and possible mitigation for actions taken by federal agencies.

Second, it provides documentation for Reclamation's obligations and requirements under the federal Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. §§1531 *et seq*.) for Reclamation's Proposed Action (i.e., execution of a WA contract and the delivery of water through the federal facilities at Folsom Dam and Reservoir pursuant thereto).

This document, therefore, will serve as the appropriate environmental review and approval document under NEPA, consisting of an Environmental Assessment (EA) and finding of no significant impact (FONSI). Reclamation is the designated lead agency under NEPA, and will publish public notices, provide for public and agency review, and respond to substantive comments on this document, as required by NEPA.

With respect to Reclamation's obligations under the federal ESA, this document also serves as the Biological Assessment (BA), which must be prepared by Reclamation pursuant to section 7(c) of the federal ESA (16 U.S.C. §1536(c)) and to 50 C.F.R. Part 402. The potential effects of Reclamation's Proposed Action on federally listed threatened and endangered species and on species proposed for federal listing must be evaluated within the context of the federal ESA. Reclamation and SSWD have been involved in coordination and informal consultations regarding the Proposed Action with both the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). Reclamation will provide NMFS with a review copy of the public Draft EA and FONSI, which includes the BA. Following NMFS review of the Draft EA and FONSI, Reclamation anticipates that NMFS will prepare a letter of concurrence finding that the Proposed Action will not adversely affect protected species under NMFS jurisdiction within the action area. Alternatively, NMFS may issue a Biological Opinion (BO) pursuant to section 7(b) of the federal ESA (16 U.S.C. §1536(b)), setting forth their opinions as to whether the action proposed by Reclamation is likely to jeopardize the continued existence of any federally listed or proposed listed species, or result in the destruction or modification of designated critical habitat for such species, addressing those species over which NMFS has jurisdiction under the federal ESA. In addition, Reclamation anticipates that NMFS will find that the Proposed Action is not likely to adversely affect essential fish habitat (EFH) for Pacific salmon. (Please refer to Chapter 5, Endangered Species Act Compliance, for additional discussion regarding NMFS consultation history.)

Reclamation also will provide USFWS with a review copy of the public Draft EA and FONSI, which includes the BA. Similar to their involvement with NMFS, Reclamation and SSWD have

been actively working with USFWS regarding ESA requirements and agreements for the Proposed Action. Following USFWS review of the Draft EA and FONSI, Reclamation anticipates that USFWS also will prepare a letter of concurrence finding that the Proposed Action will not adversely affect protected species under USFWS jurisdiction within the action area. Alternatively, USFWS may issue a BO pursuant to section 7(b) of the federal ESA (16 U.S.C. §1536(b)), setting forth their opinions as to whether the action proposed by Reclamation is likely to jeopardize the continued existence of any federally listed or proposed listed species, or result in the destruction or modification of designated critical habitat for such species, addressing those species over which USFWS has jurisdiction under the federal ESA.

This EA complements the Groundwater Stabilization Project EIR prepared by PCWA and Northridge Water District in February 1999 to satisfy its environmental review requirements pursuant to the California Environmental Quality Act (CEQA). The Groundwater Stabilization Project EIR describes the potential adverse impacts on fisheries and aquatic habitat, terrestrial vegetation and wildlife, water supply and hydrology, water quality, hydropower, flood control, recreation/aesthetics, cultural resources, land use, and geology and soils associated with the annual delivery of up to 29,000 AF to Northridge Water District from PCWA's MFP.

1.3 SCOPE OF THIS JOINT DOCUMENT AS A BIOLOGICAL ASSESSMENT

The BA analysis addresses whether the Proposed Action may affect any federally listed threatened or endangered species, candidate species, species proposed for listing, and designated or proposed critical habitat under the ESA that is known or likely to occur within the action area. The BA also addresses potential effects on EFH-managed fish species under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The action area includes all areas where direct or indirect effects of the Proposed Action may occur, including a portion of the upper American River basin, Folsom Reservoir, the lower American River, as well as all lands within SSWD North service area and adjacent water purveyor service areas where the long-term WA water may be distributed (i.e., the SSWD long-term WA service area) (Figure 1-1). The Proposed Action does not involve Reclamation's operation of CVP facilities for water supply on a regional basis, or operation of the California Department of Water Resources' (DWR) State Water Project (SWP) in response to water deliveries related to the proposed diversion. Therefore, the action area does not include most of the reservoirs and watercourses of the CVP and SWP north of and including the Sacramento-San Joaquin Delta (Delta).

This BA addresses the following major issues for aquatic, terrestrial, and riparian species within the action area:

- The presence of suitable habitat or potentially suitable habitat for each listed, proposed for listing, candidate, or EFH-managed species in the area affected by the Proposed Action (i.e., execution of a long-term WA contract);
- The established level of use or potential for use of the suitable habitat for each species in the area affected by the Proposed Action;
- The presence, and estimated magnitude, of potential disturbances to species or habitat due to the Proposed Action;
- The extent of direct habitat loss due to the Proposed Action;

- The overall level of direct and indirect effects of the Proposed Action on sensitive species; and
- The past measures implemented to mitigate for indirect effects to sensitive species and their habitat.

1.4 WARREN ACT CONTRACT

The WA (43 U.S.C. §523) of 1911 authorized the Secretary of the Interior to enter into WA contracts with water purveyors to carry non-CVP water (i.e., water not part of the CVP) through federal facilities. Under section 305 of the States Emergency Drought Relief Act of 1991 (43 U.S.C. §2211 et seq.), "Excess Storage and Carrying Capacity," the Secretary is authorized to execute contracts with municipalities, public water districts and agencies, other federal agencies, state agencies, and private entities pursuant to the WA. These contracts provide for the impounding, storage, and conveyance of non-CVP water for domestic, municipal, fish and wildlife, industrial, and other beneficial uses using any CVP facilities identified in the law, including Folsom Dam and Reservoir.

From 2000 through 2006, PCWA has supplied SSWD with surface water at the federal facilities at Folsom Dam. In order to convey this water through Folsom Dam, SSWD and Reclamation have entered into several one-year temporary "wheeling" contracts. The most recent of these one-year contracts will expire on February 28, 2007.

A draft WA contract has been prepared by Reclamation and is included in Appendix A. This draft contract includes the following key provisions:

1. Term of the contract extends from contract execution through February 28, 2031.
2. Non-Project water available to SSWD is represented by the quantities set forth under a 25-year conditional agreement between SSWD and PCWA (executed on August 21, 1995, as amended), which includes a water supply of up to 29,000 AFA from PCWA's upstream MFP reservoirs.
3. Point-of-delivery of non-Project water to SSWD is the eighty-four inch pipeline leading from the Folsom Pumping plant to the Hinkle "Y."
4. Responsibility for requiring PCWA to make releases from PCWA's upstream reservoirs during July, August, September, and October, as well as any other month where it is deemed by the State Water Resources Control Board (SWRCB) that PCWA has no right to divert the natural flow of the American River rests with SSWD.
5. PCWA's releases will include an additional five percent to account for transportation losses.
6. Non-Project water introduced in Folsom Reservoir by SSWD and remaining there for 30 days or more will be deemed unused water, available to the United States for Project purposes.
7. Responsibility for the supply and payment of all electrical power and associated transmission service charges to pump non-Project water through the federal facilities at Folsom Reservoir rests with SSWD.

8. Non-Project water conveyed to SSWD will be measured and recorded with equipment furnished, installed, operated, and maintained by SSWD, and the accuracy of such equipment will be subject to inspection by the United States.

1.5 SACRAMENTO SUBURBAN WATER DISTRICT WATER SERVICE

1.5.1 Water Entitlements

SSWD's primary water supply source has historically been groundwater. Currently, SSWD uses both surface and groundwater as its supply sources. Water from the American River diverted at Folsom Reservoir provides SSWD with its surface water. The following section provides a description of SSWD's surface water supply as well as the legal constraints of this supply. On August 21, 1995 (as amended), SSWD (*vis-à-vis* the former Northridge Water District) executed an agreement with PCWA for delivery of up to 29,000 AFA of water rights water purchased from the PCWA MFP. The agreement increases the quantity of surface water available to SSWD from 7,000 AFA in the year 2000 to 29,000 AFA in the fifteenth year. The 29,000 AF annual water supply is then maintained through the 25th year of the agreement. The term of this agreement is subject to extension. The SSWD-PCWA contract entitlement schedule is shown in **Table 1-3**. The Northridge service area began receiving surface water from PCWA in June 2000.

Table 1-3. SSWD-PCWA contract water entitlement schedule.

Year	Surface Water Entitlement (AF) [1]
June 1 through December 31, 2000[2]	7,000
2001	11,000
2002	12,000
2003	14,000
2004	16,000
2005	18,000
2006	20,000
2007	22,000
2008	23,000
2009	24,000
2010	25,000
2011	26,000
2012	27,000
2013	28,000
2014 and each year thereafter	29,000

[1] Schedule based on June 1, 2000 amended water contract between PCWA and the former Northridge Water District. These annual amounts can be increased with the approval of SSWD and PCWA.
[2] Delivery of PCWA water began June 1, 2000 and has been pro-rated to 7,000 AF for the year 2000.
Source: (SSWD 2003)

SSWD has a temporary contract with Reclamation for temporary water (referred to as Section 215 water). This contract has been exercised since 1995. SSWD Section 215 supplies have ranged between approximately 678 AFA and 12,145 AFA during the period of 1995 through 2003 (Table 1-2). Section 215 water is available on an intermittent basis subject to hydrologic conditions (SGA 2003); SSWD is eligible to purchase this temporary water when made available

by Reclamation, usually as a result of an unusually large water supply that is not otherwise storable for CVP/SWP purposes.

SSWD has a surface water entitlement of 26,064 AFA from the American River through a contract with the City of Sacramento, dating to 1964 (SSWD 2003). Water diverted under this contract is treated at the City of Sacramento's E.A. Fairbairn WTP and delivered to the Arcade service area for use in the Town and County system (Figure 1-1). This portion of the SSWD South service area and the associated water supplied from the City of Sacramento is not a part of the SSWD long-term WA contract.

The Sacramento Area Water Forum includes legal constraints on current surface water entitlements. The Water Forum Agreement was developed to preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River and to provide a reliable and safe water supply for the region. SSWD is a signatory to this agreement. SSWD has agreed under the Water Forum Agreement to limit its surface water supplies from the American River to approximately 29,000 AFA at 2030. As defined by the Water Forum Agreement, the SSWD surface water allocation from PCWA is reduced to zero in certain dry years (SSWD 2003).

The Water Forum Agreement diversion restrictions are dependent upon the March through November projected flow into Folsom Reservoir. During the first 10 years of the agreement between PCWA and SSWD, SSWD is allowed to divert up to 29,000 AFA of PCWA American River water in years when the projected March through November unimpaired flow into Folsom Reservoir is greater than 950,000 AF. Years during which the unimpaired inflow into Folsom Reservoir is less than 950,000 AF are considered to be dry years by the Water Forum. In December, January, and February following a March through November period when unimpaired inflow into Folsom Reservoir is less than 950,000 AF, SSWD will not divert PCWA water. After this 10-year period, SSWD can divert PCWA water when the unimpaired inflow into Folsom Reservoir is greater than 1,600,000 AF (i.e. "above-Hodge").

The following section provides an overview of SSWD's water delivery facilities and includes a discussion of its current water demand reduction measures, and those additional measures anticipated under the Water Forum Agreement.

1.5.2 Project Facilities

SSWD diverts American River surface water supplies from Folsom Reservoir, specifically at the urban water supply intake located within Folsom Dam. Water delivered through the urban water supply intake structure at the dam is conveyed to the Folsom Pumping Plant, where two pipelines deliver water both north and south of the American River. The North Fork Pipeline consists of an 84-inch pipeline that delivers water to SJWD and the City of Roseville. The Natoma Pipeline delivers water south via the pipeline or Natomas Ditch to the City of Folsom, its customers (e.g. Aerojet), and Folsom State Prison.

[1] The Sacramento Area Water Forum is a diverse group of business and agricultural leaders, citizen groups, water managers, and local governments in Sacramento, Placer, and El Dorado counties. The Water Forum Agreement includes provisions for each of the participating agencies to achieve the plan's two co-equal objectives: (1) to provide a reliable and safe water supply for the region's economic health and planned development to 2030; and (2) to preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River. The elements of the Water Forum Agreement address key regional issues including surface water diversions, groundwater management, dry year water supplies, water conservation, and protection of lower American River resources.

Water released from the PCWA MFP into Folsom Reservoir and delivered to SSWD is diverted and conveyed through the North Fork Pipeline to the Peterson WTP, owned and operated by SJWD, for treatment. Treated water is conveyed from the Peterson WTP via SJWD's Hinkle Reservoir through the Cooperative Transmission Pipeline and the Northridge Conveyance Pipeline before finally entering SSWD's distribution system. A general schematic of the water conveyance system and related facilities is shown on **Figure 1-2**. These components and facilities are described in more detail below.

Placer County Water Agency Middle Fork Project

The MFP, developed and owned by PCWA, regulates flows along the Middle Fork American River. The MFP is a multi-purpose hydropower, water supply, irrigation, recreation and water conservation project, and includes two large storage reservoirs (French Meadows and Hell Hole), five diversion dams, five power plants, water transmission facilities, tunnels, and other related facilities. PCWA has direct diversion rights from the North Fork American River and two primary diversions: one near the proposed Auburn Dam site and one from Folsom Reservoir (PCWA and NWD 1998). Flows not diverted from the upper American River tributaries are realized as Folsom Reservoir inflow. Folsom Reservoir is located at the confluence of the north and south forks of the American River, north of the City of Folsom, and is the uppermost boundary of the lower American River.

Folsom Pumping Plant and North Fork Pipeline

Water is diverted at Folsom Reservoir through a Reclamation owned 84-inch conduit and flows either by gravity or is pumped by the Folsom Pumping Plant into the North Fork Pipeline. The necessity for pumping depends on the reservoir's surface elevation and also on the total system demand flow requirements at that time.

Pumping usually occurs more often during the months of August through December when reservoir levels are typically low. The Folsom Pumping Plant provides the required hydraulic lift necessary to convey water diverted from Folsom Reservoir to the recipient purveyors north of the American River (e.g., SJWD, the City of Roseville, and SSWD) through the North Fork Pipeline and those south of the American River (e.g., the City of Folsom and Folsom State Prison) through the Natoma Pipeline.

The North Fork Pipeline, after leaving the Folsom Pumping Plant, splits at a junction point about 700 feet south of Hinkle Reservoir (referred to as the Hinkle "Y"), with both branches proceeding across the Placer County line (Figure 1-2). One branch of the "Y" delivers water to the Peterson WTP; the other branch continues northwest approximately 9,000 feet to the City of Roseville WTP.

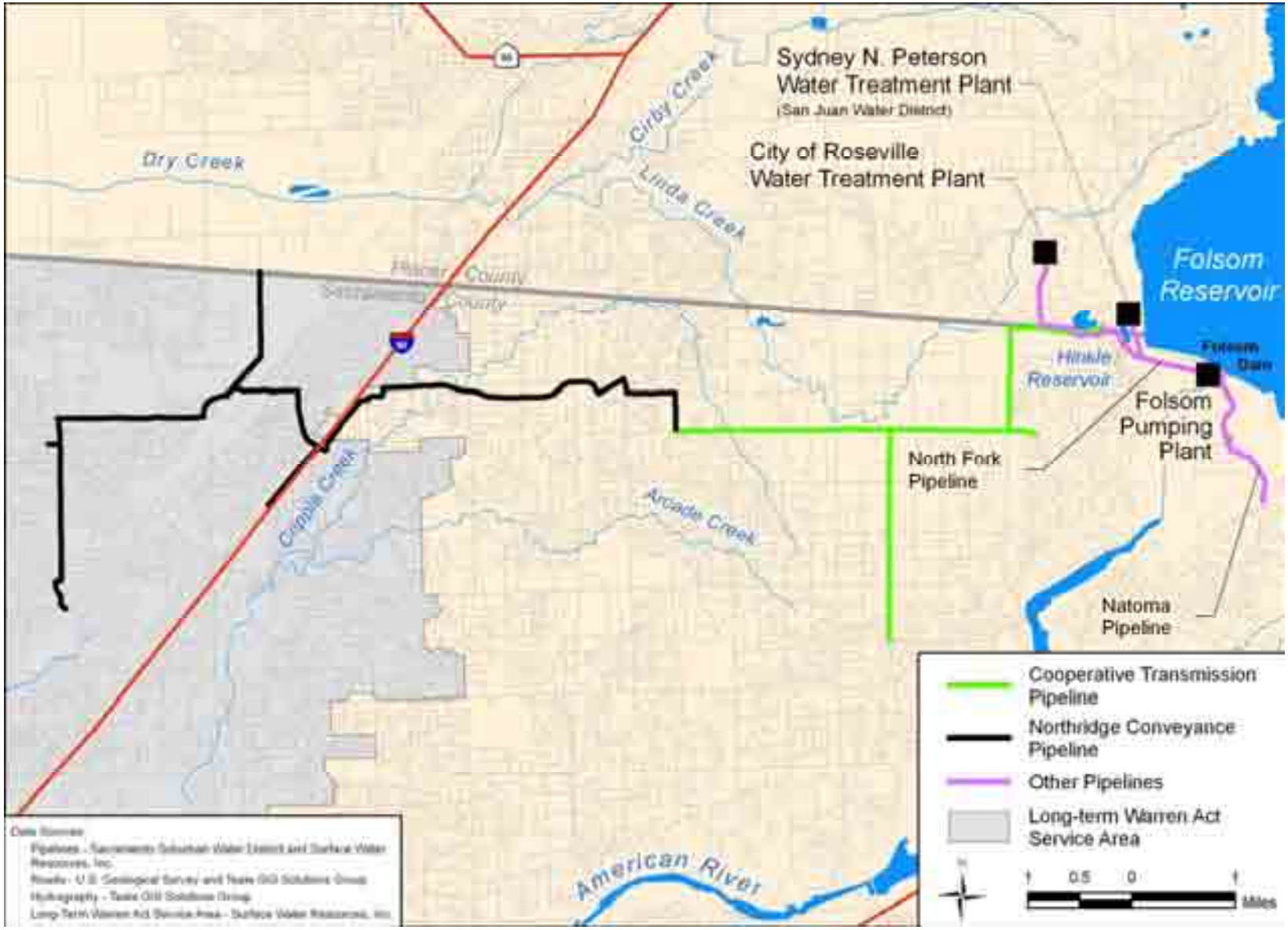

Figure 1-2. Conveyance facilities from Folsom Reservoir to SSWD long-term WA service area.

Sydney N. Peterson Water Treatment Plant

Because SSWD does not presently operate its own water treatment facilities, reliance on other facilities for treatment is required to implement the Proposed Action. The Peterson WTP is owned and operated by SJWD and has a nominal capacity of 120 million gallons per day (mgd). Currently, it supplies treated surface water from Folsom Reservoir for a family of water entities including its wholesale customers; Orangevale Water Company, Citrus Heights Water District, Fair Oaks Water District, a portion of the City of Folsom (Ashland Service Area); and its own retail service area in both Sacramento and Placer Counties. The Peterson WTP transports treated water to the Hinkle Reservoir, which has 62 million gallons of storage capacity.

Under the Proposed Action, treatment of SSWD's water supply would be accommodated at the Peterson WTP when surplus WTP capacity is available. When Peterson WTP capacity is not available for SSWD water, the City of Roseville's WTP could be used as an alternative treatment location on an exchange basis to serve treated water within a portion of the SJWD service area in Placer County, thereby reducing capacity demands on the Peterson WTP. Such an exchange would result in making sufficient capacity available at the Peterson WTP with the intention to treat all of SSWD's deliveries. However, because the City of Roseville fluoridates its water, public health requirements would require SSWD to fluoridate their wells or notify their customers when they would receive well water versus water from the City of Roseville WTP.

City of Roseville Water Treatment Plant

The City of Roseville WTP, located on Barton Road five and one-half miles southeast of Interstate 80 (I-80) in the community of Granite Bay, was built in 1971 with an original capacity of 12 mgd. The City of Roseville WTP Master Plan completed in March 1997 proposed several improvements to the WTP, which include a staged process to initially expand treatment capacity from 48 mgd to 60 mgd. With completion of improvements in 2002, the WTP currently has a treatment capacity of 60 mgd. Subsequent expansions would increase capacity to 85 mgd, and ultimately to 100 mgd.

The City of Roseville WTP represents an alternate source of treatment capacity that could be used on an exchange basis with treatment capacity at the Peterson WTP. SSWD is currently discussing particulars of a possible agreement with the SJWD and the City of Roseville that would allow SJWD to utilize surplus capacity that may be available at the City of Roseville WTP that would offset the capacity requirements for SSWD. Under this proposed agreement, the City of Roseville would treat and deliver a portion of the water supply of SJWD to the latter's retail area in Placer County. In return, additional capacity at the Peterson WTP would become available to treat all of SSWD's water associated with the Proposed Action. To implement such an exchange, a booster pump station at the City of Roseville WTP would be required with a direct connection to the SJWD retail service area in Placer County (PCWA and NWD 1998). However, issues related to fluoridation by the City of Roseville would need to be resolved to the satisfaction of all parties involved in this exchange.

Cooperative Transmission Pipeline

The Cooperative Transmission Pipeline was constructed to increase the conveyance capability of the delivery system within the SJWD service area and to provide a means of delivering a supplemental surface supply to SSWD and other agencies outside the SJWD service area. The 78- and 72-inch diameter Cooperative Transmission Pipeline extends from the Peterson WTP in

a westerly direction approximately 5.5 miles across the SJWD service area to C-Bar-C Park. Construction of the pipeline was completed in 1997 with turnouts to Citrus Heights Water District, Fair Oaks Water District, and Orangevale Water Company. The total capacity of the Cooperative Transmission Pipeline, combined with existing transmission capability, is 222 mgd. Of this total, SSWD is allocated 60 mgd (PCWA and NWD 1998).

Northridge Conveyance Pipeline

The 48-inch diameter, gravity flow Northridge Conveyance Pipeline spans approximately 7.5 miles and extends from the terminus of the Cooperative Transmission Pipeline at C-Bar-C Park to SSWD's service area. SSWD owns the total pipeline capacity of 59.2 mgd in the Northridge Conveyance Pipeline.

The Northridge Conveyance Pipeline ties into SSWD's distribution system at eight separate locations. A 30-inch spur off the main pipeline supplies water to the portion of the SSWD's service area south of I-80. The main conveyance pipeline crosses I-80 and continues as a 48-inch line to the northeast (Antelope) and northwest portions of SSWD, which would receive the majority of the surface water associated with the Proposed Action. Once water reaches the SSWD service area, it enters a grid of water mains and distribution laterals ranging in diameter from 4 to 48 inches for ultimate delivery to water users (SSWD 2003).

1.5.3 Demand Reduction Measures

Current Demand Reduction Measures

Water conservation is a method available to reduce water demands, thereby reducing water supply needs for SSWD. A coordinated effort by DWR, water utilities, environmental organizations, and other interested groups resulted in the development of a list of urban best management practices (BMPs) for conserving water. A Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California, as amended September 16, 1999, formalizes an agreement to implement these BMPs and makes a cooperative effort to reduce the consumption of California's water resources. The BMPs as defined in the MOU are generally recognized as standard definitions of water conservation measures and are listed in **Table 1-4**. Prior to the organization of the SSWD, Arcade Water District was a signatory to the MOU, while the former Northridge Water District was not. SSWD is not currently an MOU signatory.

Table 1-4. Water conservation best management practices.

No.	BMP Name
1	Water survey programs for single-family residential and multi-family residential connections.
2	Residential plumbing retrofit.
3	System water audits, leak detection and repair.
4	Metering with commodity rates for all new connections and retrofit of existing connections.
5	Large landscape conservation programs and incentives.
6	High-efficiency washing machine rebate programs.
7	Public information programs.
8	School education programs.
9	Conservation programs for commercial, industrial, and institutional accounts.
10	Wholesale agency assistance programs.
11	Conservation pricing.
12	Conservation coordinator.
13	Water waste prohibition.
14	Residential ULFT replacement programs.

SSWD conserves its water supplies through the implementation of several specific water saving measures applied to both public and private sector users, as outlined in its Water Forum Water Conservation Plan. These measures and the status of their implementation are presented in **Table 1-5**.

The SSWD Water Meter Retrofit Plan addresses metering of all residential services within the SSWD service area, as well as a transition of all residential accounts to a metered rate schedule. Current State law requires that homes built after January 1, 1992, be equipped with a water meter installed on their service connection. It has also been SSWD practice to bill these customers using a metered rate schedule. All of SSWD's commercial and multi-family housing accounts are metered and there are approximately 32,550 residential services that currently are not metered. SSWD's Water Meter Retrofit Plan proposes to implement a 20-year installation program to complete meter retrofits in advance of their Water Forum commitment to install meters on all remaining residential services by 2030. In addition, the Water Forum Agreement mandates that a yearly progression of metering be no less than 3.3 percent, regardless of whether SSWD is ahead of schedule or not (SSWD 2004).

SSWD's Water Meter Retrofit Plan outlines several criteria used in determining the priority for metering including: 1) average water consumption; 2) ease of installation; 3) whether the house is served by a front yard or back yard main; 4) lot size; and 5) type of water main. These ranking criteria were applied to selected areas to develop a ranking matrix for metering priority within the SSWD service area.

SSWD will continue to install and read meters on all new services with billing on new homes on a metered rate structure. Existing homes within the SSWD service area will be metered and transitioned to a metered rate through 2023. This expedited deadline will assure that meters installed at the beginning of the meter retrofit program will continue to be in operation at the end of the program, as the life expectancy of a meter is typically 20 years.

Table 1-5. SSWD current and projected best management practices.

BMP	Description	Implementation	Status
1. Interior and exterior water audits and incentive programs for single-family residential, multi-family residential, and institutional customers.	This practice consists of annual water audits, water use reviews, and surveys of past program participants. Audits will be conducted by trained auditors and may include low flow device installation. Audits will identify water-use problems, recommended repairs, instruction in landscape principles, irrigation timer use and, when appropriate, meter reading.	√	SSWD has provided water evaluations to residential accounts either by a trained District Conservation specialist or by an outside contractor. Evaluations have identified water-use problems, recommended repairs, provided instruction in landscape principles and irrigation timer use, and meter reading. Customers are provided information packages that include the evaluation results and water savings recommendations.
2. Plumbing retrofit of existing residential accounts.	Plumbing retrofit of existing residential accounts consists of providing low flow showerheads, faucet aerators, and toilet leak detection tablets to customers. This practice includes working with local programs and businesses to offer free water conservation information and materials to residents.	√	SSWD (*vis-à-vis* the former Northridge Water District) distributed approximately 4,000 retrofit kits in 1998 to customers paying their water bills at the District office. In 2002, SSWD distributed 500 retrofit kits to McClellan.
3. Distribution system water audits, leak detection, and repair.	The system water audit, leak detection and repair program consists of ongoing leak detection and repair within the system, focused on the high probability leak areas. This practice also includes an ongoing meter calibration and replacement program for all production and distribution meters.	√	SSWD (*vis-à-vis* the former Northridge Water District) performed leak detection on approximately six miles of mortar lined steel pipe in 1996. In addition, SSWD performed leak detection on another 15 miles of mortar line steel and tar-wrap steel pipeline and repaired identified leaks in 2002. Fifteen miles were planned for leak detection and repair in late 2005.
4. Meter retrofit.	This practice consists of adopting a plan for the installation of new and the retrofit of existing water meters for all SSWD customers. SSWD is in the process of metering all residential customers. All non-residential customers are currently metered.	Underway	SSWD is currently in its sixth year of their metering program. SSWD's current metering program plan is schedule to be completed by 2024.

√: Practice has been implemented
N/A: Not included in the SSWD Water Forum Water Conservation Plan

Table 1-5. SSWD current and projected best management practices (continued).

BMP	Description	Implementation	Status
5. Large landscape water audits and incentives for commercial, industrial, institutional (CII), and irrigation accounts.	The large landscape conservation program includes identifying all irrigation accounts and commercial, industrial, and institutional (CII) accounts with landscape of one acre and larger, and recording this information into a database. Irrigation educational information for all customers will be prepared. The program includes the hiring of a contract landscape water auditor to perform surveys and a landscape water-use review program contractor to provide audits and other services for the program.	Underway	SSWD has hired a landscape water auditor to perform surveys and a landscape water-use review program contractor to provide audits and other services for the program.
6. Landscape water conservation requirements for new and existing commercial, industrial, institutional, and multi-family developments.	This practice includes participation on a landscape task force with other local governments and water purveyors, as well as the review and potential amendment of the existing ordinance and ordinance implementation.	Underway	SSWD supports the County of Sacramento's irrigation landscape ordinance.
7. Public information.	This practice consists of full participation by the SSWD in the Sacramento Area Water Works Association (SAWWA) Conservation Committee's Public Outreach Program, or an equivalent regional program, that includes such programs as media advertising campaigns, commercial consumer outreach, promotional materials, community events and fairs, evapotranspiration data availability, a website, and allied organizations outreach. Elements of the public information program include providing information on residential metered customers' bills showing use in gallons per day for the last billing period compared to the same period in the prior year.	√	SSWD has an active role in the Water Efficiency Committee under the Regional Water Authority (RWA). SSWD produces a quarterly newsletter and monthly billing inserts that includes a regular feature devoted to the promotion of water conservation, which is distributed through the mail to all SSWD customers. A primary component of SSWD's public information program is Antelope Gardens, a xeriscape demonstration garden with year-round activities.
8. School education.	This practice consists of full participation by the SSWD in the SAWWA Conservation Committee's Public Outreach Program, or an equivalent regional program, that includes such programs as school outreach, promotional materials, community events and fairs, a website, and allied organizations outreach. Elements of the school education program include offering elementary schools tours of the SSWD xeriscape demonstration garden.	√	The RWA Water Efficiency Committee implements the Sacramento Bee school outreach program, which is a water conservation program targeted at grades K through 8. Schools request material from the Sacramento Bee to utilize the program. A program targeted at high school students is currently being developed. In addition SSWD provides an annual school education program, which began implementation in 2004.

√: Practice has been implemented
N/A: Not included in the SSWD Water Forum Water Conservation Plan

Table 1-5. SSWD current and projected best management practices (continued).

BMP	Description	Implementation	Status
9. Commercial and industrial (CI) water conservation.	This measure includes development of a conservation program for CI accounts that includes water audits targeted at the top water users. This program includes surveys of past program participants to determine if audit recommendations were implemented, and incentives related to the use of efficient water-use technologies.	√	SSWD is participating in the RWA program for this BMP. RWA has developed a conservation program to implement conservation technologies for commercial and industrial users. SSWD will continue to participate in the RWA program for the CI accounts.
10. N/A			
11. Conservation pricing for metered accounts.	This practice consists of establishing quantity-based rates for each account type and billing all metered customers utilizing rates designed to recover the cost of providing service, as well as on the quantity of water used.	√	SSWD currently implements conservation pricing for all its metered customers. Tired rates are implemented for residential customers as they become metered.
12. Landscape water conservation for new/existing single-family homes.	This measure includes development of a program that provides information of climate-appropriate landscape design, plants, and efficient irrigation through development of a local demonstration garden and annual participation at fairs and garden shows and on a landscape task force with other local governments and water purveyors.	√	SSWD has developed Antelope Gardens, a xeriscape demonstration garden with year-round activities. SSWD annually participates with other agencies via RWA in events to promote water conservation. SSWD in addition holds three community outreach days that promote SSWD interaction and water conservation.
13. Water waste prohibition.	This practice consists of enacting and enforcing measures prohibiting gutter flooding, open hoses, and non-recirculating systems in swimming pools, ponds, and fountains.	√	SSWD has a water waste prohibition ordinance that includes water waste prohibition measures and enforcement mechanisms.
14. Water conservation coordinator.	The conservation coordinator is responsible for implementing and monitoring SSWD's water conservation activities.	√	A conservation coordinator has been selected and is in place.
15. N/A			
16. Ultra-low flush toilet replacement program for non-residential customers.	This practice consists of establishing an ultra-low flush (ULF) toilet rebate program that offers necessary incentives to insure an annual replacement of at least 10% of non-residential non-ULF toilets with ULF toilets.	√	SSWD is currently implementing an ultra low flow toilet program for commercial and industrial accounts. SSWD has also provided this program to a certain number of residential accounts.

√: Practice has been implemented
N/A: Not included in the SSWD Water Forum Water Conservation Plan

Water Forum Purveyor-Specific Agreement Best Management Practices

Through its commitment to implement the Water Conservation Element established by the Water Forum Agreement, SSWD has developed a Water Conservation Plan in conjunction with Reclamation and Water Forum Agreement participants that complies with requirements of the Urban Water Management Planning Act. The Urban Water Management Planning Act calls for implementation of water Demand Management Measures (DMMs), including such measures as residential water audits, new plumbing fixtures and fixture retrofit, distribution system water audits, leak detection and repair, meter retrofit and conservation pricing, and conservation education and information programs.

SSWD's Water Forum Water Conservation Plan includes 14 BMPs that incorporate the DMMs required under the Urban Water Management Planning Act. The complete list of SSWD's BMPs along with a description of each practice is presented in Table 1-5. SSWD already has implemented the majority of these BMPs and is currently evaluating implementation of the remaining BMP programs through its commitments to the Water Forum. The individual status of SSWD's efforts to implement each of the BMPs is presented in Table 1-5.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The Proposed Action initiating preparation of this environmental document consists of Reclamation entering into a long-term (25-year) WA contract with SSWD to convey up to 29,000 AFA of non-Project (i.e., non-CVP) water through the federal facilities at Folsom Dam (e.g., Folsom Pumping Plant). This long-term contract would permit SSWD use of the CVP facilities to convey purchased MFP water from PCWA to the Peterson WTP, facilities owned and operated by SJWD, for ultimate delivery to the SSWD long-term WA service area in north-central Sacramento County (Figure 1-1).

The areas where PCWA purchased MFP water may be provided under the SSWD long-term WA contract (i.e., the SSWD long-term WA service area) are substantially developed for urban uses and are almost entirely built out. In addition, the Proposed Action would provide supplemental water for existing and near future demands that could be met through continued groundwater extraction. In other words, the entire WA service area could receive water from groundwater supplies if the PCWA purchased MFP water were not available under the WA. Therefore, there would be no growth-inducing impacts associated with implementation of the Proposed Action.

Diversion of SSWD's non-CVP water supply as purchased PCWA MFP water would occur at the urban water supply intake at Folsom Dam. As described previously in Section 1.5.2, Project Facilities, water delivered through the urban water supply intake is conveyed to the Folsom Pumping Plant at the base of the dam. The North Fork Pipeline would convey the water to the Peterson WTP for treatment. Treated water would be conveyed from the Peterson WTP via SJWD's Hinkle Reservoir through the Cooperative Transmission Pipeline and the Northridge Conveyance Pipeline before finally entering SSWD's distribution system.

Under the Proposed Action, treatment of PCWA's water supply at the Peterson WTP would be accommodated to the extent surplus WTP capacity is available. During those times when Peterson WTP capacity is not available for treatment of SSWD water, the City of Roseville WTP could be used as an alternative treatment location on an exchange basis to serve treated water within a portion of the SJWD service area in Placer County, thereby reducing capacity demands at the Peterson WTP. However, because the City of Roseville fluoridates its water, public health requirements would require other water districts with unfluoridated water to fluoridate their water supplies or notify their customers when they would receive unfluoridated water versus fluoridated water from the City of Roseville WTP. Issues related to fluoridation by the City of Roseville would need to be resolved to the satisfaction of all parties prior to implementing this exchange.

The Proposed Action includes SSWD's participation in the Water Forum Agreement and financial contribution to the Lower American River Habitat Management Element (HME). The Lower American River HME was developed as part of the Water Forum Agreement to provide mitigation for both river habitat and recreation effects of Water Forum purveyor actions, including SSWD's long-term WA contract. The lower American River HME includes detailed descriptions of all reasonable and feasible projects that could be implemented to avoid and/or

offset potential impacts to lower American River fishery and riparian resources as a result of Water Forum actions, including the Proposed Action.

As part of its Purveyor Specific Agreement with the Water Forum, SSWD is committed to financially participate in the Lower American River HME. According to the Water Forum Agreement, property owners in the unincorporated areas of Sacramento County (i.e., within the long-term WA service area) are assessed in their property taxes for county-wide water management expenses that could include many of the activities in the Water Forum Habitat Management Program. Sacramento County Water Agency Zone 13 funds will be used to meet the HME obligations for the purveyors serving the unincorporated areas of Sacramento County (Water Forum 2000).

SSWD's Purveyor Specific Agreement with the Water Forum includes a requirement that SSWD continue to work with other interested parties to pursue a project involving a diversion on the Sacramento River, a new water treatment plant, and water conveyance facilities that connect to the Northridge Conveyance Pipeline for use of Sacramento River water within the area served by the Northridge Conveyance Pipeline. This diversion project is not included as part of the Proposed Action.

2.1.1 Project Operations

PCWA and SSWD (*vis-à-vis* the former Northridge Water District) have entered into a 25-year conditional agreement, executed on August 21, 1995 (as amended), for delivery to the District of up to 29,000 AFA from the PCWA MFP, with the possibility of renewals thereafter. The SSWD-PCWA contract entitlement schedule is provided in Table 1-3.

Currently, daily operations of the MFP are primarily governed by power generation. While PCWA owns the MFP, it is presently operated to meet the requirements stipulated in a 1963 power purchase contract with Pacific Gas and Electric Company (PG&E). This contract will expire in 2013 and a separate 1962 agreement between Reclamation and PCWA provides that, following the termination of the power purchase contract between PCWA and PG&E, the MFP will be operated to "*…maximize its yield for the development, conservation, and use of water for consumptive purposes*" (PCWA and NWD 1998).

Implementation of the Proposed Action would require release of surface water from the MFP. This water would flow downstream past PCWA's facilities and into Folsom Reservoir consistent with a schedule that would be based on SSWD's monthly demand pattern. The forecasted monthly demand schedule for the SSWD North service area is provided in **Table 2-1**.

Table 2-1. SSWD North service area forecasted monthly demand schedule (AF/month).

Month	% of Annual Demand	2006	2010	2014	2020	2023	2030
Jan	5.0	1,304	1,349	1,366	1,392	1,405	1,448
Feb	4.6	1,199	1,241	1,257	1,280	1,292	1,332
Mar	5.2	1,356	1,403	1,420	1,447	1,461	1,506
Apr	7.0	1,825	1,888	1,912	1,948	1,966	2,027
May	10.0	2,607	2,697	2,732	2,783	2,809	2,895
Jun	11.5	2,998	3,102	3,141	3,201	3,231	3,330
Jul	13.3	3,468	3,587	3,633	3,702	3,736	3,851
Aug	13.4	3,494	3,614	3,660	3,730	3,764	3,880
Sept	11.0	2,868	2,967	3,005	3,062	3,090	3,185
Oct	8.1	2,112	2,185	2,213	2,255	2,275	2,345
Nov	5.7	1,486	1,537	1,557	1,587	1,601	1,650
Dec	5.2	1,356	1,403	1,420	1,447	1,461	1,506
Total	100.0	26,072	26,971	27,315	27,833	28,091	28,953

Source: HYA 1998 as cited in (PCWA and NWD 1998)

The typical monthly demand pattern for the SSWD North service area is consistent with the allowable monthly distribution of diversions as specified in the power purchase agreement between PCWA and PG&E. The power purchase agreement permits a monthly diversion distribution within the following ranges (PCWA and NWD 1998):

January	0 to 5%	July	13 to 19%
February	0 to 5%	August	13 to 16%
March	2 to 6%	September	12 to 13%
April	5 to 10%	October	4 to 8%
May	9 to 16%	November	0 to 6%
June	12 to 19%	December	0 to 5%

As a Water Forum participant and signatory, SSWD has endorsed and is implementing the Water Conservation Element of the Water Forum Agreement. Implementation of the SSWD Water Forum Water Conservation Plan, as required by the Water Forum Agreement, is currently underway (see section entitled Water Forum Purveyor Specific Agreement Best Management Practices in Chapter 1).

According to the 1995 agreement between SSWD (*vis-à-vis* the former Northridge Water District) and PCWA, water deliveries from the MFP would be subject to temporary or permanent reduction or elimination whenever PCWA notifies SSWD that it has determined an insufficient water supply to meet the needs of its customers within Placer County, to meet contractual entitlements of SJWD and/or the City of Roseville, or to meet PCWA's contractual obligations with PG&E. Simulated operations of the MFP for the period 1922 to 1991, assuming current regulatory and contractual agreements, revealed that the MFP could be operated to meet the obligations for deliveries to PCWA, the City of Roseville, and SJWD customers in Placer County, while still providing up to 29,000 AFA to the former Northridge Water District. The simulation indicated that the project demand for diversions from the MFP of 29,000 AFA, which are within the 120,000 AFA for which PCWA has water rights, could be accommodated

within the framework of operation of the MFP without impact on PG&E's power generation (PCWA and NWD 1998).

2.1.2 Water Delivery Planning and Coordination

The frequency and amount of PCWA water made available to SSWD is contingent upon numerous factors. For example, based on the completed negotiations of the Water Forum, the shared burden of dry year deficiencies on the American River among all of the Water Forum participants has been developed. SSWD and PCWA, along with other water purveyors participating in the Water Forum, are required to adhere to the dry year provisions as part of their respective commitments to the Water Forum Agreement. During times when surface water would be unavailable, SSWD would rely on groundwater to meet its water supply needs.

PCWA and SSWD (*vis-à-vis* the former Northridge Water District) have agreed to include conditions in the SWRCB order approving the change in place of use under PCWA's water rights that will implement SSWD's dry-year diversion provisions under the Water Forum Agreement. Generally, under the Water Forum Agreement, PCWA water would be delivered to SSWD for the first 10 years of the agreement only when March through November unimpaired inflow to Folsom Reservoir exceeds 950,000 AF; thereafter, only when March through November unimpaired inflow exceeds 1,600,000 AF (i.e., "above Hodge") unless delivery in years of lower flow is approved by the SWRCB (see Section 1.5.1, Water Entitlements, for further discussion). The operational criteria described below are included in the Stipulated Agreement[1] for dismissal of the protest by Reclamation to PCWA's petition for a change in place of use:

1. *Permittee's[2] deliveries of water from the American River to Northridge Water District (Northridge) under the August 21, 1995, PCWA-Northridge Agreement, and any amendments thereto, will be subject to the following restrictions:*
   a. *Permittee shall not deliver any water within the expanded place of use in Sacramento County until the recipient of such water has entered into such contracts with Reclamation as may be necessary for access to and use of Federal facilities needed for rediversion of such water.*
   b. *During the 10-year period following the date when water is first available to Northridge under the Northridge Agreement (the 10-year period):*
      (1) *Water shall be delivered to Northridge only in years when the projected March through November unimpaired inflow into Folsom Reservoir is greater than 950,000 acre-feet.*
      (2) *Notwithstanding paragraph (1) above, in December, January, and February following a March through November period when unimpaired inflow into Folsom Reservoir was less than 950,000 acre-feet, water may be delivered to Northridge when and after water is being released from Folsom Reservoir for flood protection.*
      (3) *PCWA's deliveries of American River water to Northridge in each of these years will be limited to the amounts of water provided in the water use schedule in the Northridge Agreement, which allows annually increasing diversions to a maximum total of 29,000 acre-feet per year under that agreement.*
   c. *After the 10-year period, Permittee may deliver American River water to Northridge only:*
      (1) *In years when the projected March to November unimpaired inflow to Folsom Reservoir is greater than 1,600,000 acre-feet, or*

[1] Stipulated Agreement for Dismissal of Reclamation's Protest to PCWA's Petition to Expand the Place of Use Under Application 18085 (Permit 13856) and Application 18087 (Permit 13858).

[2] Permittee is PCWA.

(2) Notwithstanding paragraph (1) above, in a December, January, and February following a March through November period when the unimpaired inflow into Folsom Reservoir was less than 1,600,000 acre-feet, when and after water is being released from Folsom Reservoir for flood protection, or

(3) As otherwise permitted by the Board[3] pursuant to an Order releasing or modifying the provisions of c(1) and c(2): Provided, that such Order is issued after a hearing before the SWRCB in which Reclamation is afforded the opportunity to participate; and Provided further, that this paragraph is not interpreted as constituting a waiver by Reclamation of any rights it may have to contest the subject Board Order in a court of competent jurisdiction.

2. *Nothing in this stipulation shall affect the right of Permittee to terminate the Northridge Agreement if Permittee reasonably determines that any term of the Board Order resulting from the hearing is unacceptable.*
3. *Nothing in this stipulation is intended to restrict deliveries of water from Folsom Reservoir for use by Northridge under a Section 215 (surplus water) contract with Reclamation, whenever such water may be available.*

The Proposed Action includes development of a three-phased operations plan that would govern annual deliveries to SSWD. The phased operations would be made up of three elements as described below:

First Element — SSWD's scheduled demands for the current year would be identified and a 12-month plan developed by April 1 of each year. The plan would include forecasted MFP and Folsom Reservoir operations and also identify those facilities available for storage, treatment, and conveyance of the scheduled water deliveries.

Second Element — The 12-month plan would be updated monthly and include any modifications to planned deliveries based on changing hydrologic conditions, and resultant changes in Folsom Reservoir operations, MFP operations, and the availability of facilities needed to store, treat, or convey the scheduled water deliveries.

Third Element — This element would involve weekly and/or daily adjustments to the proposed deliveries to account for potential unplanned operational changes and alterations in SSWD's demands.

Within the context of operational planning, SSWD would serve as the primary lead agency responsible for delivery coordination. SSWD would coordinate with PCWA, SJWD, Reclamation, and the City of Roseville (if necessary) to ensure proper communication and ongoing information exchange necessary to develop annual operations plans. SSWD would initiate an annual meeting on or about April 1 of each year with representatives from each of the coordinating agencies. This meeting would establish the annual delivery schedule, and determine PCWA releases from MFP storage, diversions from and/or pumping at Folsom Reservoir, and determine the required operations for water treatment, storage, and conveyance among the available facilities. Adjustments to the initial delivery schedule would be made at this time in consideration of Reclamation's April forecast of Folsom Reservoir operations.

[3] Board is the California State Water Resources Control Board.

2.2 ACTION AREA

The action area is located on the eastern edge of the Sacramento Valley at the base of the Sierra Nevada foothills. The action area consists of a portion of the upper American River basin, Folsom Reservoir, the lower American River, and the SSWD long-term WA service area (**Figure 2-1**). The portion of the upper American River basin included as part of the action area includes two MFP storage reservoirs (French Meadows and Hell Hole), the Middle Fork American River, and the North Fork American River downstream of the confluence with the Middle Fork. Flows released from French Meadows and Hell Hole reservoirs are realized as Folsom Reservoir inflow via the Middle Fork and North Fork American rivers.

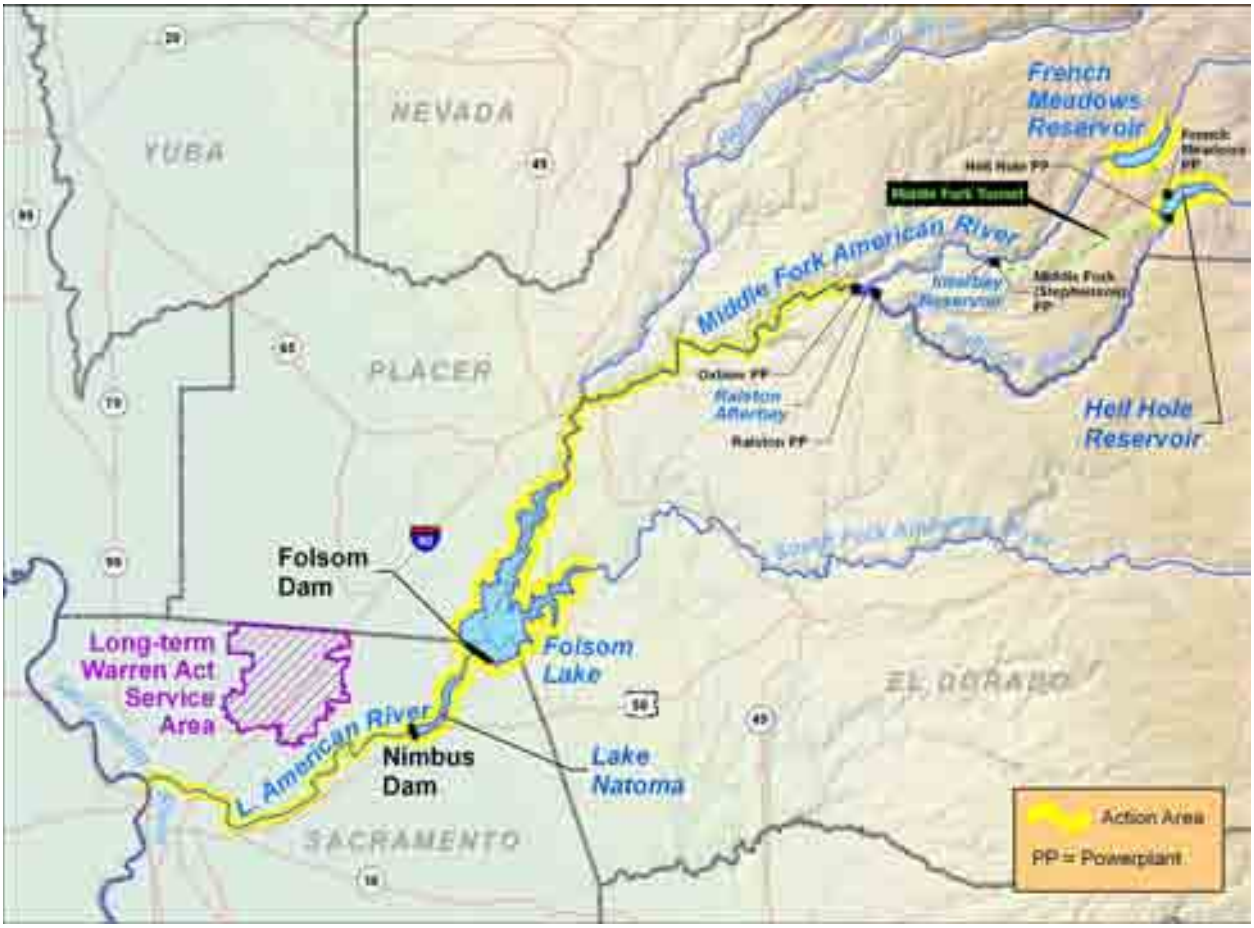

Figure 2-1. Action area.

SSWD lies within the broad Central Valley floor and is bordered by the foothills and Sierra Nevada to the east, and the Sacramento River to the west. It is located in north-central Sacramento County, approximately 9 miles northeast of downtown Sacramento, California and 10 miles southwest of Folsom Reservoir. The SSWD long-term WA service area encompasses approximately 35.5 square miles, the majority of which is located within unincorporated Sacramento County. However, approximately 270 acres (0.4 square miles) along the western boundary of the long-term WA service area are located within the City of Sacramento, and approximately 3,194 acres (5 square miles) along the eastern boundary lie within the City of Citrus Heights.

SSWD was organized on February 1, 2002 through the consolidation of two water districts: Northridge Water District and Arcade Water District. The long-term WA service area includes the former Northridge service area, McClellan Business Park, the North Highlands System portion of the former Arcade service area, and portions of the Cal-Am service area (Figure 1-1).

2.3 DEVELOPMENT OF PROJECT ALTERNATIVES

The environmental review process under NEPA requires that all reasonable alternatives to the Proposed Action be examined. Alternatives initially developed during the environmental review process have been evaluated and screened so that only a reasonable range of alternatives are carried forward for detailed analysis in this environmental document. Those alternatives determined to be unreasonable are eliminated from further consideration. The following sections discuss the alternative development and screening process and identify those alternatives that would fulfill the purpose of and need for the Proposed Action that are selected for further consideration in this environmental document.

Consistent and standardized criteria for establishing the reasonableness or feasibility of specific alternatives have been applied. Reasonable alternatives have been developed that are bound by the notion of desirability, emphasize common sense realities, provide a realistic range of choices designed to accomplish the objectives, consider actions outside of the federal agencies' capability or jurisdiction (if they too, are judged to be reasonable), are practical, technically and economically appropriate, timely to implement, and include a No Action alternative.

The No Action alternative is defined generally as representing existing management and operational conditions that would continue current activities without significant change. It also includes future actions that are likely to proceed regardless of implementing the Proposed Action. Under the NEPA context, the future No Action alternative is normally used as a basis for comparison of the impacts between alternatives.

2.3.1 Identification of Preliminary Alternatives

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating alternatives that were not developed in detail (40 CFR 1502.14). At the outset of the environmental review process, an interdisciplinary team developed an initial list of potential alternatives to the Proposed Action. This initial list of potential alternatives included an array of options, including alternative locations from which SSWD could take delivery of its purchased PCWA MFP water. The main criterion for development of the preliminary alternatives was that an alternative must contribute to the stabilization of the aquifer and avoid further exacerbation of the current groundwater overdraft situation. In addition, alternatives selected for further consideration in this environmental document must meet the purpose and need for the project, which is to reduce reliance on groundwater resources within southwestern Placer County and the SSWD service area through a substitute surface water supply provided by PCWA, as available. The preliminary alternatives initially identified are discussed below.

Purchase of a Surface Water Supply from Another Source

This alternative would involve the purchase of up to 29,000 AFA from the SWP, acquisition of a new federal CVP water services contract from Reclamation, or SSWD acquisition of a surface water supply from a water agency or district(s) with upstream storage capability on the

American River or other system. Such agencies could include Sacramento Municipal Utility District (SMUD), NID, El Dorado Irrigation District (EID), Yuba County Water Agency (YCWA), or PG&E. The option of SSWD purchasing a surface water supply from another source was initially considered. This option, however, would not achieve the purpose and need for the project to provide for the delivery of PCWA surface water to SSWD. This alternative was eliminated from further consideration.

Reliance on Increased Surface Water Storage Upstream on the American River (e.g., Auburn Dam)

Under this alternative, SSWD would rely on surface water storage from a new or expanded upstream reservoir on the American River (e.g., Auburn Dam). This alternative would achieve the purpose and need for the project by reducing reliance on groundwater resources and providing for the delivery of PCWA surface water to SSWD. This alternative was selected for further consideration during the alternative screening process (see Section 2.3.2, Screening of Preliminary Alternatives).

Placer County Water Agency Water Supply Acquired from the Sacramento River Near Natomas

This alternative assumes future diversion and treatment of the purchased 29,000 AFA from PCWA by SSWD at a treatment facility on the Sacramento River, upstream of the American River confluence near Natomas. This alternative would rely on water intake, treatment, and subsequent delivery facilities that are either planned or have been previously identified as potential projects. This alternative would involve an exchange between PCWA and the SWP and/or CVP so that releases from Oroville Reservoir and/or Shasta Reservoir could be made equivalent to PCWA's releases into Folsom Reservoir and Reclamation's subsequent release to the lower American River. Because this point of diversion does not involve Folsom Dam and Reservoir (and likely no federal facilities), acquisition of a WA contract may not be required. Conveyance of treated water to the long-term WA service area would not be facilitated through the Cooperative Transmission Pipeline, but instead would rely on either new or improved conveyance systems for raw and treated water. This alternative would achieve the purpose and need for the project by reducing reliance on groundwater resources and providing for the delivery of PCWA surface water to SSWD. This alternative was selected for further consideration during the alternative screening process (see Section 2.3.2, Screening of Preliminary Alternatives).

Placer County Water Agency Water Supply Delivered by the City of Sacramento's Sacramento River Water Treatment Plant

This alternative assumes diversion and treatment of the purchased 29,000 AFA from PCWA by SSWD at the City of Sacramento's Sacramento River WTP. This alternative would rely on existing water intake and treatment facilities, and subsequent delivery and conveyance facilities that are either existing, planned, or have been previously identified as potential projects. Conveyance of treated water to the long-term WA service area would not be facilitated through the Cooperative Transmission Pipeline, but instead would rely on either new or improved conveyance systems for treated water. Because this point of diversion does not involve Folsom Dam and Reservoir (and likely no federal facilities), acquisition of a WA contract may not be required. This alternative would achieve the purpose and need for the project by reducing reliance on groundwater resources and providing for the delivery of PCWA surface water to

SSWD. This alternative was selected for further consideration during the alternative screening process (see Section 2.3.2, Screening of Preliminary Alternatives).

Placer County Water Agency Water Supply Delivered by the City of Sacramento's E.A. Fairbairn Water Treatment Plant

This alternative assumes diversion and treatment of the purchased 29,000 AFA from PCWA by SSWD at the City of Sacramento's E.A. Fairbairn WTP on the American River. This alternative would rely on existing and/or improved water intake and treatment facilities, and subsequent delivery and conveyance facilities that are either existing, planned, or have been previously identified as potential projects. Conveyance of treated water to the long-term WA service area would not be facilitated through the Cooperative Transmission Pipeline, but instead would rely on either new or improved conveyance systems for treated water, as well as additional pumping facilities. This alternative would achieve the purpose and need for the project by reducing reliance on groundwater resources and providing for the delivery of PCWA surface water to SSWD. This alternative was selected for further consideration during the alternative screening process (see Section 2.3.2, Screening of Preliminary Alternatives).

Placer County Water Agency Water Supply Delivered by Other Planned or Existing Water Treatment Facilities

This alternative assumes diversion and treatment of the purchased 29,000 AFA from PCWA by SSWD at other planned or existing water treatment facilities on the American River operated by Carmichael Water District and/or SSWD (i.e., Keller WTP proposed by the former Arcade Water District). This alternative would rely on water intake, treatment, and subsequent delivery and conveyance facilities that are either existing, planned, or have been previously identified as potential projects. Conveyance of treated water to the long-term WA service area would not be facilitated through the Cooperative Transmission Pipeline; additional conveyance and pumping facilities likely would be necessary to deliver treated water to the SSWD long-term WA service area from these facilities. This alternative would achieve the purpose and need for the project by reducing reliance on groundwater resources and providing for the delivery of PCWA surface water to SSWD. This alternative was selected for further consideration during the alternative screening process (see Section 2.3.2, Screening of Preliminary Alternatives).

Placer County Water Agency Water Supply Delivered by the Auburn Pump Station

Under this alternative, SSWD would acquire up to 29,000 AFA from PCWA and take delivery of its MFP water supply from the new pumping plant at Auburn on the North Fork of the American River. Although this alternative would not rely on any federal facilities (e.g., at Folsom Dam and Reservoir), and acquisition of a WA contract may not be required, it is possible that SSWD would be required to facilitate NEPA compliance with Reclamation because diversions of its MFP water rights water from PCWA would cross Reclamation easements at the Auburn pumping plant. Conveyance of treated water from the Auburn pumping plant to the long-term WA service area would be facilitated through a combination of existing, improved, or new conveyance systems, as well as new pumping facilities. This alternative would achieve the purpose and need for the project by reducing reliance on groundwater resources and providing for the delivery of PCWA surface water to SSWD. This alternative was selected for further consideration during the alternative screening process (see Section 2.3.2, Screening of Preliminary Alternatives).

Wastewater Reclamation

Under this alternative, SSWD would rely on reclaimed wastewater to meet its water demand requirements. This alternative, however, involves the use of treated wastewater as a non-potable supply for M&I uses only. It would be limited to the use of highly treated wastewater for landscape irrigation, or as a possible supply for injection/percolation into the local groundwater aquifer. Some industrial users could also possibly benefit from this supply for certain process water needs. However, this alternative would not achieve the purpose and need to provide for the delivery of PCWA water to SSWD. This alternative was eliminated from further consideration.

Water Demand Reduction/Water Conservation

Under this alternative, SSWD would rely on short- and long-term water demand reduction management strategies to reduce existing and future water demands within the SSWD long-term WA service area. Demand management strategies that could be implemented or have been to some degree include contemporary water conservation measures consisting of water audits, residential meter retrofit programs, odd/even day landscape watering schedules, watering prohibitions, ultra low-flow toilets and shower fixtures, new home/business water metering, conservation education, etc. Other measures include domestic irrigation improvements, improvements to commercial water use efficiency, xeriscaping, and leak detection programs. Demand reduction and water conservation measures are already being implemented throughout the SSWD long-term WA service area and additional savings through water conservation are anticipated to occur in the future. However, this alternative would not achieve the purpose and need to provide for the delivery of PCWA water to SSWD. This alternative was eliminated from further consideration.

2.3.2 Screening of Preliminary Alternatives

Subsequent to the development of potential alternatives to the Proposed Action that would meet the purpose and need for the project, the interdisciplinary team developed a set of screening criteria, which included the following:

Technical and Physical Criterion (T/PC)	An alternative must be technically and physically feasible.
Institutional Criterion (IC)	An alternative must not be conditioned upon speculative approvals, agreements, permits, or other discretionary actions.
Economic Criterion (EC)	An alternative should not incur costs that would result in undue hardships to the consumer or water purveyor implementing the project.
Reliability Criterion (RC)	An alternative should minimize the risk of disruptions to water supplies by maximizing technical reliability and be based upon a water source with the least risk of shortages.
Efficacy and Timing Criterion (E/TC)	An alternative must be able to be implemented within a reasonable timeframe.

Public Health Criterion (PHC)	An alternative must provide a water supply that meets or exceeds state and federal water quality standards associated with its intended use.
Operational Criterion (OC)	An alternative should endeavor to maximize a system's operational and implementation flexibility.
Environmental Criterion (ENVC)	An alternative should avoid or substantially lessen the proposed project's significant environmental impacts.

Each preliminary alternative selected for further consideration was evaluated based on its ability to pass the above set of screening criteria. The results of the screening analysis based on the application of the screening criteria are summarized in **Table 2-2**. It identifies which of the preliminary alternatives were carried forward for further analysis and which were rejected as infeasible. The summary table also provides a brief explanation of the determination concerning the inclusion or rejection of each preliminary alternative.

2.4 ALTERNATIVES SELECTED FOR DETAILED ANALYSIS

Based on the results of the screening evaluation as presented and summarized in Table 2-2, none of the preliminary alternatives were deemed to have satisfied a significant number of the screening criteria so as to be considered feasible. Therefore, only the Proposed Action, as described above in Section 2.1 and the No Action Alternative described below in Section 2.4.1 were carried forward for detailed analysis in this environmental document.

2.4.1 No Action Alternative

Under the No Action Alternative, Reclamation would not participate in a long-term (25-year) WA contract with SSWD. However, the No Action Alternative assumes that SSWD would continue to request an annual renewal of temporary one-year WA contracts. SSWD has received PCWA MFP water under temporary on-year WA contacts in each year since 2000. Reclamation's current policy delegates the authority to execute temporary contracts for a period not to exceed 5 years and capacity not exceeding 10,000 AFA. Reclamation has conveyed volumes greater than 10,000 AF to SSWD in the past, but contracts exceeding this authorized period and/or capacity require a basis of negotiation that is approved by the Commissioner.

The No Action Alternative assumes delivery of 10,000 AF of MFP water to SSWD under temporary WA contracts on an annual basis. However, to provide the most rigorous assessment of potential environmental impacts under NEPA, a "No Water Delivery" scenario was also developed (Appendix C). The No Water Delivery scenario allows a sensitivity analysis to be performed through a comparison of the differences between the "Proposed Action vs. No Action" hydrologic modeling results and the "Proposed Action vs. No Water Delivery" hydrologic modeling results.

Reclamation's approval of temporary WA contracts in each future year is not assured due to potential increases in costs, changes in legislation, and capacity constraints at Folsom Dam and Reservoir. While temporary WA contracts are subject to the same infrastructure constraints as long-term WA contracts, temporary WA contracts also have priority constraints. For example, when capacity is available at the federal facilities, Reclamation delivers water first to CVP water

service contractors, then to long-term WA contract holders, and lastly to temporary one-year WA contract holders. Several constraints are assumed to be the same under either a long-term WA contract or a temporary one-year WA contract. For example, both long-term and temporary one-year WA contracts are subject to constraints associated with the operation of Folsom Dam and Reservoir. The assumption under this No Action Alternative is that operationally SSWD would be able to wheel its purchased PCWA MFP water supply through these facilities subsequent to Reclamation's water delivery obligations regardless of whether Reclamation approved a long-term WA contract or a temporary one-year WA contract. Potential capacity constraints at Folsom Dam and Reservoir are also assumed to be the same under either a long-term WA contract or a temporary one-year WA contract. The assumption under this No Action Alternative is that capacity constraints would not affect the frequency in which SSWD could wheel its purchased PCWA MFP water supply through these facilities under either a long-term WA contract or a temporary one-year WA contract with Reclamation because, in either case, SSWD would be allowed use of available capacity only after Reclamation meets its prior water delivery obligations.

According to Reclamation's NEPA Policy Act Handbook, the no action alternative provides an appropriate basis by which all other alternatives are compared. Section 6.4.2.1 of Reclamation's NEPA Policy Handbook states… "*The no action alternative should not be considered identical to existing conditions of the affected environment because future changes may occur regardless of whether any of the action alternatives are chosen. These future actions could include other water development projects, land use changes, or municipal development. The no action alternative is therefore often described as 'the future without the Federal project.' Where the no action alternative is different from existing conditions, the document should clearly discuss the differences.*"

Continued wheeling of purchased PCWA MFP water supplies through the federal facilities at Folsom Dam and Reservoir is considered a reasonably foreseeable future action under NEPA due to its inclusion and prior analysis in several environmental documents including the:

- CVP Water Supply Contracts Under Public Law 101-514 (Section 206) Environmental Impact Statement (EIS)/EIR (April 1998)
- Central Valley Project Improvement Act (CVPIA) Programmatic EIS (October 1999)
- Groundwater Stabilization EIR (February 1999)
- Water Forum Proposal EIR (October 1999)
- NOAA Fisheries BO on the Long-Term CVP and SWP Operations Criteria and Plan (OCAP) (October 2004)
- USFWS BO on the Long-Term CVP and SWP OCAP (July 2004)
- CVP Long-Term Service Contract Renewals - American River Division EIS (June 2005)

In addition, NMFS and USFWS define the environmental baseline as follows: "*…the past and present impacts of all Federal, State, or private actions and other human activities in an action area, the anticipated impacts of all proposed Federal projects in an action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process* [50 CFR §402.02]."

Because continued wheeling of purchased PCWA MFP water supplies through the federal facilities at Folsom Dam and Reservoir is included in the above NMFS and USFWS OCAP BOs, potential hydrologic impacts associated with this action have already undergone Section 7

consultation under the federal ESA. Therefore, the Proposed Action is included in the environmental baseline as defined in Chapter 5, Endangered Species Act Compliance.

Table 2-2. Results of preliminary alternative screening analysis.

Alt	Description	Lesser Env. Impacts Relative to the Proposed Action (ENVC)	Screening Criteria Not Met							Explanation of Determination	Carried Forward for Analysis in the EA
			T/PC	IC	EC	RC	E/TC	PHC	OC		
1	**Reliance on increased surface water storage upstream on the American River (e.g., Auburn Dam) -** Under this alternative, SSWD would rely on surface water storage from a new or expanded upstream reservoir on the American River (e.g., Auburn Dam).	Potentially		✓			✓			Reliance upon increased storage upstream on the American River, perhaps through utilization of an Auburn Dam facility, would require the approval and final construction of a new dam and reservoir facility. This action is too speculative to be considered reasonable at this time, therefore, it is not carried forward for detailed analysis in the EA.	No
2	**PCWA water supply acquired from the Sacramento River near Natomas -** Under this alternative, SSWD would divert its PCWA supply from the Sacramento River near Natomas. This alternative would involve an exchange between PCWA and the SWP and/or CVP so that releases from Oroville Reservoir and/or Shasta Reservoir could be made equivalent to PCWA's releases into Folsom Reservoir and Reclamation's subsequent release to the lower American River. New facilities including an intake structure, water treatment plant, and conveyance for both raw and treated water would be required.	Potentially		✓			✓			Unlike the Sacramento River or Fairbairn WTP alternatives (see 3 and 4 below), infrastructure components for diversion and treatment would need to be constructed at a new site on the Sacramento River near Natomas. Although this alternative, in concept, has received considerable discussion among the Water Forum participants and is presently accepted as a viable alternative for several historic American River diversions, the time necessary to complete such a project likely would result in its failing the E/TC. In addition, this alternative could have lesser environmental impacts to Folsom Reservoir and the lower American River, relative to the Proposed Action. However, this action is too speculative to be considered reasonable at this time, therefore, it is not carried forward for detailed analysis in the EA.	No
3	**PCWA water supply delivered by the Sacramento River WTP - -** Under this sub-alternative, SSWD would divert from the Sacramento River and treat its water at the Sacramento River WTP. This alternative point of diversion would rely on water intake, treatment, and subsequent delivery facilities that are either existing or planned and may be available to supply water to SSWD. Because the point of diversion under this alternative would not involve Folsom Dam and Reservoir (Proposed Action), conveyance of treated water to the SSWD long-term WA service area would need to rely on existing, expanded, or new conveyance systems.	Potentially							✓	Infrastructure components (i.e., intake structure and treatment facility) for the City to divert and treat a surface water supply from the Sacramento River are currently in place at the Sacramento River WTP. Capacity at the Sacramento River WTP may be available and an agreement with the City of Sacramento would be required for SSWD to be provided appropriate capacity at the Sacramento River WTP to receive and treat a PCWA water supply. New treated water conveyance, however, would be required to deliver the water to the SSWD long-term WA service area. Given that the intake structure and treatment facility necessary for SSWD to utilize a Sacramento River WTP alternative currently exists, the components of this alternative passed the screening criteria. In addition, this alternative could have lesser environmental impacts to Folsom Reservoir and the lower American River, relative to the Proposed Action. However, because the City of Sacramento fluoridates its water, public health requirements would require SSWD to fluoridate their wells or notify their customers when they would receive well water versus water from the Fairbairn WTP. This requirement likely would result in its failing the OC, therefore this alternative is not carried forward for detailed analysis in the EA.	No

Criterion: T/PC = Technical/Physical; IC = Institutional; EC = Economic; RC = Reliability; E/TC = Efficacy and Timing; PHC = Public Health; OC = Operational; ENVC = Environmental

Table 2-2. Results of preliminary alternative screening analysis.

Alt	Description	Lesser Env. Impacts Relative to the Proposed Action (ENVC)	Screening Criteria Not Met							Explanation of Determination	Carried Forward for Analysis in the EA
			T/PC	IC	EC	RC	E/TC	PHC	OC		
4	**PCWA water supply delivered by the Fairbairn WTP -** Under this alternative, SSWD would divert from the American River at the Fairbairn WTP and treat its water at the same facility. This alternative point of diversion would rely on water intake, treatment, and subsequent delivery facilities that are either existing or planned and may be available to supply water to the SSWD long-term WA service area. Because the point of diversion under this alternative would not involve Folsom Dam and Reservoir (Proposed Action), conveyance of treated water to the SSWD long-term WA service area would need to rely on existing, expanded, or new conveyance systems.	Potentially		✓	✓		✓		✓	Infrastructure components for diversion and water treatment at the Fairbairn WTP are currently in place, however, the existing treatment plant capacity likely is inadequate to provide SSWD with its needed surface water supply. Development of additional treatment plant capacity likely would be required and an agreement entered into with the City of Sacramento. Approval of a new PCWA point of diversion would be required and the existing water right would require revision to include the SSWD North area as a specified place of use for water supplied from the Fairbairn WTP to the SSWD long-term WA service area. New treated water conveyance and pumping facilities also would be required to deliver water from the Fairbairn WTP to the SSWD long-term WA service area. Because the City of Sacramento fluoridates its water, public health requirements would require SSWD to fluoridate their wells or notify their customers when they would receive well water versus water from the Fairbairn WTP. This requirement likely would result in its failing the OC. The time, funding, and approval process necessary to expand the water treatment plant likely would result in its failing the E/TC, as well as the EC and IC, therefore, this alternative was not carried forward for detailed analysis in the EA.	No
5	**PCWA water supply delivered by other planned or existing water treatment facilities -** Under this alternative, SSWD would divert and treat its PCWA water supply from the lower American River at the diversion facilities operated by Carmichael Water District and/or SSWD (i.e., Keller WTP proposed by the former Arcade Water District). Because the point of diversion under this alternative would not involve Folsom Dam and Reservoir (Proposed Action), conveyance of treated water to the SSWD long-term WA service area from these facilities would need to rely on existing, expanded, or new conveyance systems.	Potentially		✓		✓	✓			Diversion from the lower American River at a new and/or improved water diversion and treatment facility separate from the Fairbairn WTP would require adequate capacity and a willingness on the part of the facility owners (i.e., Carmichael Water District) to sell capacity to SSWD. The new water treatment plant recently constructed by Carmichael, to take advantage of an improved Ranney collector and microtunnel system, is designed to 22 mgd. This capacity likely would meet the long-term needs of Carmichael, but is unlikely to provide SSWD with its needed capacity. Approval of a new PCWA point of diversion would be required and the existing water right would require revision to include the SSWD North area as a specified place of use for water supplied from Carmichael Water District to the SSWD long-term WA service area. Moreover, the proposed water treatment facility associated with the former Arcade Water District (i.e., Keller WTP) is uncertain as to its likely implementation. Therefore, this alternative is not carried forward for detailed analysis in the EA.	No

Criterion: T/PC = Technical/Physical; IC = Institutional; EC = Economic; RC = Reliability; E/TC = Efficacy and Timing; PHC = Public Health; OC = Operational; ENVC = Environmental

Table 2-2. Results of preliminary alternative screening analysis.

Alt	Description	Lesser Env. Impacts Relative to the Proposed Action (ENVC)	Screening Criteria Not Met							Explanation of Determination	Carried Forward for Analysis in the EA
			T/PC	IC	EC	RC	E/TC	PHC	OC		
6	**PCWA water supply delivered by the Auburn Pump Station –** Under this alternative, SSWD would acquire up to 29,000 AFA from PCWA and take delivery from the Auburn Pump Station on the North Fork American River. Expansion of the Auburn Pump Station and additional conveyance and pumping facilities likely would be necessary to deliver treated water to the SSWD long-term WA service area from the Auburn Pump Station.	Potentially		✓	✓		✓		✓	Infrastructure components for diversion and treatment are currently under construction at the Auburn Pump Station that will allow the City of Roseville to divert and treat a surface water supply from the North Fork American River. Development of additional pump station capacity would be required, and an agreement entered into with the City of Roseville for SSWD to be provided appropriate capacity to receive and treat a PCWA water supply. New treated water conveyance and pumping facilities would be required to deliver water from the Auburn Pump Station to the SSWD long-term WA service area. Because the City of Roseville fluoridates their water, public health requirements would require SSWD to fluoridate their wells or notify their customers when they would receive well water versus water from the Auburn Pump Station. This requirement likely would result in its failing the OC. The time, funding, and approval process necessary to expand the Auburn Pump Station likely would result in its failing the E/TC, as well as the EC and IC, therefore, this alternative was not carried forward for detailed analysis in the EA.	No
Criterion: T/PC = Technical/Physical; IC = Institutional; EC = Economic; RC = Reliability; E/TC = Efficacy and Timing; PHC = Public Health; OC = Operational; ENVC = Environmental											

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the environmental resources in the areas that may be affected by implementation of the Proposed Action or alternatives (i.e., the action area). These descriptions provide the necessary background information for each resource from which to analyze the potential impacts of the project, as described in Chapter 4, Environmental Consequences. The project has the potential to affect water-related resources (e.g., fisheries and aquatic resources, water supply and hydrology, etc.) as a result of changes in reservoir releases, instream flows, and water temperatures, as well as changes to the existing water supply system. Other resources (e.g., terrestrial resources) have the potential to be affected through secondary indirect impacts associated with delivery of MFP water, primarily as a result of growth or development within the long-term WA service area.

This chapter describes the affected environment for the following resources:

- Water Supply and Hydrology
- Hydropower
- Fisheries and Aquatic Resources
- Terrestrial and Riparian Resources
- Cultural Resources
- Recreation

During preparation of the EA it became evident that the Proposed Action would have no impact on several resources with the action area, either because the Proposed Action: (1) does not include any construction-related activities; or (2) would not directly result in land conversions. Therefore, no affected environment description has been provided in this chapter and no impact analysis has been conducted in Chapter 4, Environmental Consequences, related to potential impacts on air quality, noise, geology and soils, visual resources, land use, transportation, public utilities, or public services.

Because the Proposed Action does not involve Reclamation's operation of CVP facilities for water supply and other environmental or regulatory obligations, the action area does not include many of the reservoirs and watercourses of the CVP or SWP, north of and including the Delta. The action area consists of a portion of the upper American River basin (French Meadows and Hell Hole reservoirs, and the Middle Fork American River), Folsom Reservoir, the lower American River, as well as all lands within the SSWD long-term WA service area where the water may be distributed.

3.2 WATER SUPPLY AND HYDROLOGY

The American River watershed covers approximately 1,895 square miles. Its headquarters originate in the Sierra Nevada Mountains, flowing west through the foothills into the Sacramento Valley and terminating at the confluence with the Sacramento River. The upper American River watershed includes the North, Middle, and South forks. Upstream reservoirs provide hydropower generation and storage, but not flood control. Total upstream storage is approximately 820,000 AF (Reclamation 2004). The lower American River begins below Nimbus Dam and flows along the valley floor until it reaches the Sacramento River in the City of Sacramento. Surrounding the confluence of the American and Sacramento rivers is a floodplain covering approximately 116,000 acres (PCWA and NWD 1998).

The average annual run-off in the American River basin is approximately 2.6 million AF. Run-off in the area varies throughout the year, generally peaking in April or May, depending on snowmelt. The lower American River accounts for approximately 15 percent of Sacramento River flows (Reclamation 2004).

The region's municipal, agricultural, and industrial demands are met by water purveyors in areas above, around, and below Folsom Reservoir. El Dorado Irrigation District (EID), the City of Roseville, SJWD, the Folsom State Prison, and the City of Folsom are the main purveyors that divert water from Folsom Reservoir.

3.2.1 Regulatory Setting

The SWRCB and nine Regional Water Quality Control Boards (RWQCB) regulate water resources in California. The SWRCB protects water quality and determines rights to surface water use. Specifically, the SWRCB appropriates surface water, oversees disputes over rights to waterbodies, establishes surface and groundwater quality standards, and oversees the RWQCBs, which implement water quality standards and regulations.

3.2.2 French Meadows and Hell Hole Reservoirs

Construction of French Meadows and Hell Hole reservoirs was completed in 1966 and 1965, respectively. Maximum storage capacity is 136,000 AF in French Meadows Reservoir and 208,000 AF in Hell Hole Reservoir. French Meadows Reservoir is located in the upper Middle Fork American River watershed, about 16 miles west of Lake Tahoe. Hell Hole Reservoir is located about 3 miles southeast of French Meadows Reservoir on the Rubicon River. Water is released from these storage reservoirs downstream to Ralston Afterbay on the Middle Fork American River.

3.2.3 Middle Fork and North Fork American Rivers

The headwaters for the Middle Fork American River watershed (i.e., the Rubicon River) are at Rockbound Valley in the Desolation Wilderness (elevation 9,974 feet). The Middle Fork watershed extends westward to the confluence with the North Fork American River, east of Auburn (elevation 650 feet). The average annual yield for the Middle Fork American River for the period of 1959 through 1991 was 805,000 AF. The Rubicon River is the main tributary to the Middle Fork American River, and receives its water from the South Fork Rubicon River and Pilot Creek. Other tributaries to the Middle Fork American River are Duncan Canyon Creek and Long Canyon Creek.

PCWA developed and PG&E currently operates the MFP, a multi-purpose project designed to conserve and control waters of the Middle Fork American River, the Rubicon River, and certain tributaries for irrigation, domestic, and commercial purposes, and for the generation of electricity. French Meadows and Hell Hole reservoirs are the primary storage facilities, but the MFP also includes five diversion dams, five power plants, diversion and water transmission facilities, five tunnels, and related facilities. Water that is not diverted to storage travels through a system of tunnels and power plants before being released into the Middle Fork American River. Water from French Meadows and Hell Hole reservoirs is released downstream to Ralston Afterbay on the Middle Fork American River. Ralston Afterbay, located approximately 20 miles east of Auburn, is operated as a re-regulating reservoir for the MFP. Ralston Afterbay releases reflect upstream regulation to maximize hydropower generation

while meeting an instream flow requirement of 75 cfs on the Middle Fork American River. The Middle Fork then joins the North Fork American River before flowing into Folsom Reservoir. PCWA has water rights allowing for power generation and recreational uses, as well as for irrigation and incidental domestic and municipal and industrial uses. PCWA's water rights authorize 120,000 AF of consumptive uses of the combined waters of the North and Middle Fork American Rivers.

The headwaters to the North Fork American River watershed are in the Sierra Nevada at an elevation of approximately 9,000 feet. The watershed extends westerly to Folsom Lake, south of Auburn, at the 650-foot elevation. The major tributary to the North Fork is the North Fork of the North Fork, which is unregulated. The North Fork flows are altered by the North Fork Dam at Lake Clementine, upstream of its confluence with the Middle Fork.

Downstream of its confluence with the Middle Fork American River, North Fork flows are a combination of regulated and unregulated flows. Flows in the North Fork below its confluence with the Middle Fork are directly affected by fluctuations in Ralston Afterbay releases, but are attenuated by the unregulated flows from the North Fork of the Middle Fork and the North Fork American River, which exhibit less diurnal fluctuation.

Average annual flow in the North Fork American River for the period 1942 through 1992 is 594,000 AF. North Fork American River flows have been estimated based upon upstream gage measurements. The dry season flow at just below the confluence with the Middle Fork averages about 1,100 cfs, but flows during the summer periodically fluctuate to as low as 100 to 200 cfs because of upstream power production. The estimated peak flow of the 1.5-year flood event is 12,400 cfs. The peak flow of the 100-year flood event is estimated to be 220,000 cfs (Reclamation 1996).

3.2.4 Lower American River

The lower American River consists of the 23-mile stretch of river from Nimbus Dam to the confluence of the American and Sacramento rivers in the City of Sacramento. Average lower American River flows downstream of Folsom Dam at Fair Oaks are approximately 2,650,000 AF (Reclamation 2004). The flow regime in the lower American River has been significantly altered since the completion of Folsom and Nimbus dams.

Folsom Reservoir is the principal reservoir on the American River, with a maximum storage capacity of 977,000 AF. Major tributaries in the upper watershed of the American River include the North, Middle, and South forks. Folsom Dam was originally authorized for construction by the U.S. Army Corps of Engineers (Corps) in 1944 as a 355,000 AF flood control unit. The Dam was reauthorized in 1949 as a 1,000,000 AF multi-purpose facility, with a surface area of 11,450 acres. Reclamation operates Folsom Dam and Reservoir for the purposes of flood control, meeting water contract obligations, providing adequate instream flows in the lower American River for recreation and fisheries resources, and as a means of meeting Delta water quality standards.

Lake Natoma serves as the Folsom Dam afterbay and was formed as a result of Nimbus Dam. Nimbus Dam was built in 1955 by the Corps and later transferred to Reclamation. Lake Natoma has a maximum storage capacity of 9,000 AF, and at its full capacity, consists of approximately 500 surface-acres of water. Lake Natoma is operated as a re-regulating reservoir

that accommodates the diurnal flow fluctuations caused by the Folsom Power Plant. Nimbus Dam, along with Folsom Dam, regulates water releases to the lower American River. In addition to its role as a regulating facility for Folsom Dam releases, Nimbus Dam is the diversion location for the Folsom South Canal.

Folsom Dam and Reservoir and Nimbus Dam and Lake Natoma are operated as part of the CVP, a multi-purpose project owned by Reclamation that stores and transfers water from the Sacramento, San Joaquin, and Trinity river basins to the Sacramento and San Joaquin valleys. The CVP was authorized by Congress in 1937 for water supply, hydropower generation, flood control, navigation, fish and wildlife, recreation, and water quality control purposes.

The CVP service area extends approximately 430 miles through much of California's Central Valley, from Clair Engle and Shasta reservoirs in the north to Bakersfield in the south (**Figure 3-1**). The CVP is composed or some 20 reservoirs with a combined storage capacity of more than 11 million AF, 11 power plants, and more than 500 miles of major canals and aqueducts (Reclamation 2004). In most years, the combination of carryover storage and runoff into CVP reservoirs is sufficient to provide the water to meet CVP contractors' demands. Since 1992, increasing constraints placed on operations by legislative and ESA requirements have removed some of the capability and operations flexibility required to deliver water to CVP contractors.

The minimum allowable flows in the lower American River are defined by SWRCB Decision 893 (D-893) which states that, in the interest of fish conservation, releases should not ordinarily fall below 250 cfs between January 2 and September 15, or below 500 cfs at other times. D-893 minimum flows are rarely the controlling objective of CVP operations at Nimbus Dam. Nimbus Dam releases are nearly always controlled during significant portions of a water year by either flood control requirements or are coordinated with other CVP and SWP releases to meet downstream SWRCB Delta Water Quality Control Plan requirements and CVP water supply objectives (Reclamation 2004).

Power regulation and management needs occasionally control Nimbus Dam releases. Nimbus Dam releases are expected to exceed the D-893 minimum flows in all but the driest of conditions. Reclamation is participating in continuing discussions with the Sacramento Water Forum, USFWS, NMFS, the California Department of Fish and Game (CDFG), and other interested parties regarding integration of a revised flow standard for the lower American River into CVP operations and water rights. Reclamation intends to accomplish such incorporation, including associated revisions to the OCAP project description, in coordination with these agencies and interested parties. It is anticipated that a revised OCAP project description, amending the lower American River flows to make them consistent with the revised flow standards, will be presented to the agencies, together with supporting material and analysis needed for review under ESA Section 7. Until such an action is presented to and adopted by the SWRCB, minimum flows on the lower American River are limited by D-893. Releases of additional water are made pursuant to Section 3406 (b)(2) of the CVPIA (Reclamation 2004).

Figure 3-1. CVP/SWP facilities.

Rapid flow fluctuations in the lower American River are primarily in response to either flood control operations at Folsom Dam or operational changes in releases to meet SWRCB water

quality standards in the Delta. The close proximity of Folsom Dam and Reservoir to the Delta, and the relatively short period of time for the releases to reach the Delta, results in Folsom Reservoir commonly being relied upon to meet Delta standards in lieu of releases from more distant CVP reservoirs. In the past, rapid flow fluctuations were common, however, Reclamation, together with the Lower American River Operations Group, presently attempts to minimize these fluctuations in both magnitude and frequency.

3.2.5 Regional Groundwater Basin

An extensive groundwater aquifer system underlies the Central Valley. Useable groundwater in Sacramento County is categorized into a shallow aquifer zone and an underlying deeper aquifer zone, separated by a discontinuous clay layer. The thickness of the deeper aquifer ranges from 200 to 100 feet in Sacramento County and contains water of poor quality (Sacramento County Water Agency 1997). Purveyors in the project area (SSWD and Cal-Am) rely on groundwater or some combination of groundwater and surface water for their water supplies, but rely primarily on groundwater for meeting their service area demands.

Available data indicate that groundwater levels in Sacramento County were fairly stable at an average of 30 feet above mean sea level (msl) between 1930 and 1940. Between 1941 and 1970, however, the county-wide average groundwater elevations declined to about five feet below msl (Sacramento County Water Agency 1993). Recent groundwater investigations confirm that continued pumping of groundwater in northern Sacramento County and southwestern Placer County at current and projected future pumping rates would exacerbate overdraft of the underlying aquifer. The former Northridge Water District conducted groundwater-modeling studies to evaluate the impacts of conjunctive use of surface water and groundwater on the North American River Groundwater Basin. The modeling results have shown that, without any additional surface water deliveries to northern Sacramento County, the cone of depression currently centered beneath McClellan Business Park would increase in depth by about 10 to 20 feet, shifting northeasterly towards Placer County. Furthermore, groundwater levels in northern Sacramento County and southwestern Placer County would decline, relative to current conditions. Without a substantial reduction in the use of this aquifer, dewatering at its eastern fringe within northeastern Sacramento County and in the west Roseville and Lincoln areas of Placer County would likely occur (PCWA and NWD 1998).

Declining groundwater levels in northern Sacramento County and southwestern Placer County have been under investigation for some time and have resulted in initiatives set out to determine how best to alleviate the current groundwater overdraft. Prior to the use of imported surface water, groundwater levels along the Placer/Sacramento county line west of the City of Roseville were declining at a rate of one and one-half feet per year (PCWA and NWD 1998). A reduction in pumpage from several SSWD wells has resulted in the local recovery of groundwater levels throughout the North service area, where surface water has been used. According to a June 2002 report prepared by Luhdorff and Scalmanini, SSWD has observed an increase in groundwater elevations of up to 20 feet as a result of its importation of treated surface water. Groundwater levels continue to fluctuate seasonally, as are typically observed, but also appear to have stabilized or slightly increased since 1998 (SSWD 2003). Curtailment of current and future demands on the underlying groundwater aquifer are required to avoid further depletion as well as related adverse impacts associated with existing groundwater degradation and a lowered water table, including increased risks of land subsidence, increased

groundwater pumping (and wellhead treatment) costs, and the ultimate risk of some existing wells going dry.

The current containment and remediation program of the United States Department of the Air Force is intended to prevent the existing contaminated plume beneath McClellan and the Southern Pacific rail yard from migrating as groundwater withdrawals continue within the area of the cone of depression (PCWA and NWD 1998). In recognition of the uncertainties regarding the effectiveness of the remediation plan due to potential future changes in regional hydrogeologic conditions, specifically, changes in groundwater elevations and flow direction, a range of contingency measures have been identified as part of the Groundwater Operable Unit Final Remedial Investigation/Feasibility Study for McClellan Air Force Base. McClellan's remediation efforts are part of the region's EPA Superfund projects and are directed toward clean up of contaminated groundwater. The Department of the Air Force is and would continue to be, responsible for any required modifications to its remediation system to address changing hydrogeologic conditions.

In addition to the recognized need to stabilize groundwater in the project area, a 1993 Sacramento County Water Policy requires that groundwater overdraft be eliminated no later than 2000. As a result, PCWA and the former Northridge Water District, in cooperation with SJWD and the City of Roseville, initiated actions to implement a long-term groundwater stabilization project. When implemented, the groundwater stabilization project would contribute to the prevention of further groundwater lowering in the region by replacing the use of up to 29,000 AFA of groundwater with available surface water supplies. Surface water supplies were to be used primarily by the former Northridge Water District and McClellan for M&I purposes. The Groundwater Stabilization Project Draft EIR was issued by PCWA and the former Northridge Water District in October 1998 and the Final EIR was issued in February 1999. These environmental documents analyzed a total of up to 29,000 AFA of surface water to be purchased from PCWA and supplied to the former Northridge Water District.

3.2.6 Long-Term Warren Act Service Area

SSWD was formed in February 2002 through the consolidation of two water districts; Northridge Water District and Arcade Water District. SSWD serves a population of approximately 168,000 through approximately 45,6000 active service connections in Sacramento County (SSWD 2003). Only the SSWD North service area is included within the long-term WA service area (see Figure 1-1). The North service area constitutes approximately 23.2 square miles and includes McClellan Business Park, as well as portions of the Arden and Arcade areas, Foothill Farms, Citrus Heights, Carmichael, North Highlands, Sacramento, and Antelope.

SSWD's primary water supply source has historically been groundwater. The North service area contains 28 active and standby groundwater wells, with a combined capacity of 30,960 gpm (SSWD 2003). The SSWD North service area started receiving surface water supplies in 1991. Currently, SSWD uses both surface and groundwater as its supply sources (refer to Section 1.1.2, Water Supply Needs, for further discussion).

Approximately 12.3 square miles of the Cal-Am service area is included within the SSWD long-term WA service area and consists of the Lincoln Oaks and Antelope systems. Cal-Am, formerly the Citizens Utility Company of California, is a private water purveyor that supplies water to approximately 57,000 customers within an approximately 44 square mile service area.

Cal-Am urban service areas include all of Isleton, as well as portions of South Sacramento, North Highlands, Arden-Arcade, Rancho Cordova, Elverta, Citrus Heights, Antelope, Security Park, and Walnut Grove. Approximately 43,432 AFA of water is supplied to Cal-Am customers, all of which is groundwater that is pumped from 105 wells within the service area (Sacramento Local Agency Formation Commission Website 2005).

SSWD diverts PCWA American River surface water supplies from Folsom Reservoir, specifically at the urban water supply intake located within Folsom Dam. PCWA water from Folsom Reservoir is diverted and conveyed through the North Fork Pipeline to the Peterson WTP, owned and operated by SJWD, for treatment. SSWD does not presently operate its own water treatment facilities, therefore relying on other facilities for treatment. Treated water is conveyed from the Peterson WTP via SJWD's Hinkle Reservoir through the Cooperative Transmission Pipeline and the Northridge Conveyance Pipeline before finally entering SSWD's distribution system. Specific details regarding these components and facilities are provided in Section 1.5.2, Project Facilities.

On August 21, 1995 (as amended), SSWD (*vis-à-vis* the former Northridge Water District) executed an agreement with PCWA for delivery of up to 29,000 AFA per year of water rights water purchased from PCWA's MFP. The agreement increases the quantity of surface water available to SSWD from 7,000 AFA in the year 2000 to 29,000 AFA in the fifteenth year. The 29,000 AF annual water supply is then maintained through the 25th year of the agreement. The Northridge service area began receiving surface water from PCWA in June 2000. Additional details regarding the SSWD-PCWA agreement, including legal constraints on the delivery of MFP water to SSWD associated with the Sacramento Area Water Forum Agreement are discussed in Section 1.5.1, Water Entitlements.

SSWD has a Section 215 water contract with Reclamation for delivery of surplus water that has been exercised since 1995. SSWD Section 215 supplies have ranged between approximately 678 AFA and 12,145 AFA during the period of 1995 through 2003 (Table 1-2). Section 215 water is available on an intermittent basis subject to hydrologic conditions (SGA 2003); SSWD is eligible to purchase this surplus water in average water years (SGA 2003).

3.3 HYDROPOWER

Hydroelectric facilities generate a significant portion of California's energy requirements. Water agencies and private electric utilities own and operate in-stream reservoirs that store and release water to generate hydroelectric power. Electric utilities produce power for their customers, while water agencies produce power for their own use and market the excess to electric utilities, government and public installations, and commercial customers. Hydropower facilities that rely on water from the Middle Fork American River watershed include the PCWA MFP and CVP facilities downstream of the Middle Fork American River.

3.3.1 Regulatory Setting

The Western Area Power Administration (Western) is the marketing agency for power generated at Reclamation facilities in the American River basin. Created in 1977 under the Department of Energy (DOE) Organization Act, Western markets and transmits electric power throughout 15 western states. Western's Sierra Nevada Customer Service Region (Sierra Nevada Region) annually markets approximately 8,000,000 kilowatt hours (kWh), including

3,000,000 kWh produced by CVP generation and 5,000,000 kWh produced by other sources. Western sells excess CVP capacity and energy (supplementary to CVP internal needs) to municipal utilities, irrigation districts, and institutions and facilities such as wildlife refuges, schools, prisons, and military bases.

Western's mission is to sell and deliver electricity that is excess to Project use (power required for CVP operations). Western's power marketing responsibility includes managing the federal transmission system and, as a federal agency, ensuring that operations of the hydropower facilities are consistent with its regulatory responsibilities. The hydroelectric generation facilities of the CVP are operated by Reclamation. Reclamation manages and releases water in accordance with the various acts authorizing specific projects and in accordance with other laws and enabling legislation. Hydropower operations at each facility must comply with minimum and maximum flows and other constraints set by Reclamation, USFWS, or other regulatory agencies, acting in accordance with law or policy.

Existing contracts for the sale of Sierra Nevada Region power resources expired December 31, 2004. Western has developed a marketing plan that defines the products to be offered and the eligibility and allocation criteria that would lead to allocations of CVP electric power resources beyond the year 2004.

3.3.2 Middle Fork Project

The MFP is a multipurpose project that uses the waters of the Middle Fork of the American River, the Rubicon River, and certain tributaries for irrigation, domestic, and commercial purposes and for the generation of electric energy. Principal features of the Middle Fork Project are two storage and five diversion dams, five power plants, diversion and water transmission facilities, five tunnels, and related facilities. The power plants have a combined generating capacity of 223,753 kW and include Hell Hole, French Meadows, Lowell J. Stephenson, Ralston, and Oxbow. The power division of PCWA operates the MFP.

French Meadows Power Plant at Hell Hole Reservoir

The French Meadows Power Plant is at Hell Hole Reservoir south of the South Fork of the American River. PCWA diverts water from French Meadows Reservoir through the French Meadows Tunnel. The water passes through the Francis turbine at the power plant, which has a capacity of 15,300 kW (Jones, pers. comm. 2004). French Meadows Power Plant generates an average of 5,200 megawatt hours (MWh) monthly. The water is then held in Hell Hole Reservoir.

Hell Hole Power Plant

The Hell Hole Power Plant is on the Rubicon River at Hell Hole Reservoir. Water flows from the reservoir through the Hell Hole Dam to the Hell Hole Power Plant. The Hell Hole Power Plant has a capacity of 725 kW (Jones, pers. comm. 2004) and generates an average of 190 MWh monthly. From the plant, the water flows through a tunnel to the Ralston Afterbay.

Lowell J. Stephenson Power Plant

The Lowell J. Stephenson Power Plant is on the Middle Fork of the American River at the Middle Fork-Ralston Interbay. Water for the power plant comes from French Meadows Reservoir, through the French Meadows Tunnel, through Hell Hole Reservoir, and finally

through the Middle Fork Tunnel. The water passes over the Impulse turbine at the power plant, which has a capacity of 122,400 kW (Jones, pers. comm. 2004). The Lowell J. Stephenson Power Plant generates an average of 43,100 MWh monthly. The water flows from the power plant through the Ralston Tunnel.

Ralston Power Plant

The Ralston Power Plant is on the Rubicon River at the Ralston Afterbay. Water for the Ralston Power Plant follows the same path as the water for the Lowell J. Stephenson Power Plant, through the Ralston Tunnel, to the Ralston Power Plant. The Ralston Power Plant has an Impulse turbine and a capacity of 79,200 kW (Jones, pers. comm. 2004). The Ralston Power Plant generates an average of 31,200 MWh monthly. From the plant, the water flows back into the Ralston Tunnel, which continues to the Oxbow Power Plant (below).

Oxbow Power Plant

The Oxbow Power Plant is on the Middle Fork of the American River at the Oxbow Bar. Water for the Oxbow Power Plant flows from the Ralston Power Plant through the Ralston Tunnel. The plant has a Francis turbine and a capacity of 6,128 kW (Jones, pers. comm. 2004). From the power plant, the water continues to the Auburn Ravine and to the lower American River.

3.3.3 Central Valley Project

Hydropower generation at CVP facilities substantively contributes to the reliability of California's electrical power system. Impacts to CVP hydropower operations can result from increased water diversions that result in both lower reservoir levels and less water flow through turbines. In addition to potential impacts to electric system reliability, loss of hydropower capacity and generation can also result in indirect environmental impacts by necessitating increased power generation using means that are less environmentally benign.

The CVP hydropower system consists of eight power plants and two pump-generating plants located within the Sacramento River, American River, and Delta Export and San Joaquin Valley service areas. The CVP hydropower system is fully integrated with the northern California power system and provides a significant portion of the hydropower available for use in northern and central California. The installed capacity of the system is 2,044,350 kW (Reclamation 2001). In comparison, the combined capacity of the 368 operational hydroelectric power plants in California is 12,866,000 kW. The area's major power supplier, PG&E, has a generating capacity from all sources of over 20,000,000 kW.

Folsom and Nimbus Power Plants

The principal purpose of the Folsom and Nimbus power plants is to generate power using the water releases mandated for downstream appropriators, flood control, fish, and other uses.

The Folsom Power Plant is at the foot of Folsom Dam on the north side of the American River. The Folsom Power Plant has three generating units, with a combined capacity of 215,000 kW (Reclamation 2001), and a total release capacity of approximately 8,600 cfs. By design, the facility is operated as a peaking facility. Peaking plants schedule the daily water release volume during the peak energy demand hours to maximize generation at the time of greatest need. During other hours of the day, the plant may release little or no water, generating little or no power. The Folsom Power Plant generates an average annual 620,000 MWh.

Pumping energy requirements are affected by total reservoir storage, because less storage means that water must be lifted a greater height from the reservoir surface. Reductions in Folsom Reservoir elevations caused by Reclamation's actions would increase energy requirements for pumping water at the Folsom Pumping Plant and the EID pumping plant at Folsom Reservoir. These impacts, like those for hydropower, would not be expected to cause direct environmental effects, but would have economic consequences and may cause indirect effects requiring additional energy generation.

The Nimbus Power Plant is on the right abutment of Nimbus Dam (Lake Natoma) on the north side of the American River. To avoid fluctuations in flow in the lower American River, Nimbus Dam and Lake Natoma serve as a regulating facility. While the water surface elevation fluctuates, releases to the lower American River remain constant. The Nimbus Power Plant consists of two generating units with a release capacity of approximately 5,100 cfs (Reclamation 2001). Electric generation from this facility is continuous throughout the day.

3.4 FISHERIES AND AQUATIC RESOURCES

The analysis of potential effects on fisheries and aquatic resources includes an assessment of the warmwater and coldwater fisheries of French Meadows, Hell Hole, and Folsom reservoirs, and an assessment of fishery resources of the Middle Fork American River below Ralston Afterbay, the North Fork American River below the confluence with the Middle Fork American River, and the lower American River below Nimbus Dam to its confluence with the Sacramento River.

3.4.1 Regulatory Setting

Several state and federal public trust resource agencies are responsible for managing the fisheries resources and aquatic habitat located in the American River Basin. Under the federal ESA, management of non-anadromous fish and other aquatic species is the responsibility of the USFWS, whereas NMFS assumes management responsibilities for anadromous fish species. For CEQA purposes, CDFG serves as the state "trustee agency" for fish and wildlife species protected by the California ESA (CESA) (Fish and Game Code Section 1802). The CEQA process for this project included preparation of the Groundwater Stabilization EIR, which addressed potential effects on state listed species (PCWA and NWD 1999). The following discussion addresses fisheries management plans, programs, and other regulatory initiatives relevant to implementation of the Proposed Action.

Central Valley Project Improvement Act and Anadromous Fish Restoration Program

The CVPIA (Title 34 of P.L. 102-575) amends the authorization of the CVP to include fish and wildlife protection, restoration, and mitigation as project purposes of the CVP having equal priority with irrigation and domestic uses of CVP water. It also elevates fish and wildlife enhancement to a level having equal purpose with power generation.

The CVPIA identifies several goals to meet these new purposes. Significant among these is the broad goal of restoring natural populations of anadromous fish (Chinook salmon [*Oncorhynchus tshawytscha*], steelhead [*Oncorhynchus mykiss]*, green and white sturgeon [*Acipenser medirostris* and *A. transmontanus*], American shad [*Alosa sapidissima*], and striped bass [*Morone saxatilis*]) in Central Valley rivers and streams to double their recent average levels. Under the CVPIA, the Anadromous Fish Restoration Program (AFRP) directs the Secretary of the Interior to:

> *"… develop within three years of enactment and implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991 ..."*

Section 3406(b)(1) jointly imparted the responsibilities of implementing the CVPIA to the USFWS and Reclamation, although the USFWS has assumed the lead role in the development of the AFRP. The Final Restoration Plan for the AFRP was adopted on January 9, 2001 and will be used to guide the long-term development of the AFRP. Additionally, under USFWS direction, technical teams have assisted in the establishment of components of the AFRP. A key element of the program is instream flow recommendations, including objectives for the lower American River and upper Sacramento River.

The Secretary of the Interior also is directed under Section 3406(b)(2) of the CVPIA to:

> *"… dedicate and manage annually 800,000 acre-feet of Central Valley Project yield for the primary purpose of implementing the fish, wildlife and habitat restoration purposes and measures authorized by this title; to assist the State of California in its efforts to protect the waters of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; and to help to meet such obligations as may be legally imposed upon the Central Valley Project under state or federal law following the date of enactment of this title, including but not limited to additional obligations under the federal Endangered Species Act."*

A portion of the 800,000 AF initially was used annually to meet interim increased instream flow requirements below Shasta, Folsom, Whiskeytown and New Melones dams beginning in 1993; ESA requirements imposed on the CVP beginning in 1993 and 1994; and the CVP share of the SWRCB's Water Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary beginning in 1995. In November 1997, the Department of the Interior (Interior) released its Final Administrative Proposal for the full utilization of the 800,000 AFA. That proposal was immediately taken to federal court where a temporary injunction was imposed. The above interim use of the 800,000 AFA continued. Interior provided the court with a revised proposal for use of the 800,000 AFA in November 1999 and the court lifted the injunction soon after that date.

Interior has fully utilized the 800,000 AFA since January 2000. That water is used in the following ways:

- To increase the instream flows downstream of the Shasta, Folsom, Whiskeytown and New Melones dams above the legal minimum flow requirements in place prior to the enactment of CVPIA for the purpose of improving fisheries habitat and partially implementing measures authorized by CVPIA.
- Restoring Central Valley Streams: To meet the CVP share of the SWRCB Decision 1641 (D-1641) which is to provide protection of all beneficial uses in the Delta. This action matches the CVPIA charge to assist the State of California to protect the Delta.
- To reduce CVP and, at times, SWP export pumping from the south Delta for the primary purpose of protecting federally listed and candidate species under the ESA.

The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act

The Salmon, Steelhead, Trout and Anadromous Fisheries Program Act was enacted in 1988. At that time CDFG reported that the natural production of salmon and steelhead trout in California had declined to approximately 1,000,000 adult Chinook salmon, 100,000 coho salmon, and 150,000 steelhead. In addition, CDFG reported that the naturally spawning salmon and steelhead trout resources of the state had declined dramatically within the past four decades primarily as a result of lost habitat in many streams in the state. The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act declares that it is the policy of the State of California to increase the state's salmon and steelhead resources, and directs CDFG to develop a plan and program that strives to double the salmon and steelhead resources (Fish and Game Code Section 6900).

Coordinated Operations Agreement

The 1986 Agreement Between the United States of America and DWR for Coordinated Operation of the CVP and the SWP defines the rights and responsibilities of the CVP and SWP with respect to in-basin water needs and provides a mechanism to measure and account for those responsibilities. In-basin uses are defined in the Coordinated Operations Agreement (COA) as legal uses of water required under the State Water Resources Control Board (SWRCB) Decision 1485 (D-1485) Delta Standards. Because both the CVP and SWP utilize the Sacramento River and the Delta as common conveyance facilities, reservoir releases and Delta export operations must be coordinated to ensure that the CVP and SWP each retains it share of the commingled water and each bears its share of the joint obligations to protect beneficial uses.

Balanced water conditions are defined in the COA as periods when it is agreed that releases from the upstream reservoirs plus unregulated flows approximately equals the water supply needed to meet Sacramento Valley in-basin demands plus exports. Excess water conditions are periods when sufficient water is available to meet all beneficial needs, and the CVP/SWP are not required to make releases from reservoir storage. When water must be withdrawn from reservoir storage under the COA, the CVP is responsible for providing 75 percent and the SWP 25 percent of the water to meet Delta Standards. When unstored water is available for export (i.e., under balanced conditions) the sum of CVP stored water, SWP stored water, and the unstored water for export is allocated at 55/45 percent to the CVP and SWP, respectively.

The COA has evolved considerably since 1986 with changes to facilities and operating criteria. New flow standards such as those imposed by the SWRCB have revised how projects are operated. Also, additional ESA responsibilities (i.e., temperature control on upstream operations) have been added to the projects. Although the burden of meeting these new responsibilities has been worked out internally between the CVP and SWP, the COA has never been officially amended or evaluated for consistency. Previous NMFS' BOs have evaluated operations with the internal changes that have taken place in the COA to date.

Long-Term Central Valley Project and State Water Project Operations Criteria and Plan

The Long-Term CVP and SWP OCAP serves as the operational standard by which Reclamation operates the integrated CVP/SWP system. The OCAP describes how Reclamation and DWR operate the CVP and the SWP to divert, store, and convey water consistent with applicable law (Reclamation 2004). Reclamation and DWR completed an update to the OCAP in 2004 to reflect recent operational and environmental changes occurring throughout the CVP/SWP system.

Additionally, Reclamation received BOs from both the USFWS and NMFS in 2004 and, thus, successfully completed its Section 7 ESA consultation for the OCAP. The terms and conditions identified in the USFWS and NMFS BOs establish the instream habitat conditions and operational requirements that Reclamation and DWR must maintain as part of integrated CVP/SWP operations.

Central Valley Project Long-Term Water Service Contracts

There are approximately 250 long-term water service contracts that are dependent upon CVP operations to provide water for agricultural, or M&I uses. Most of these contracts extend for a term of 40 years, and were scheduled to expire in 2004 or subsequent dates prior to 2029. In February 2005, Reclamation issued decisions (a Record of Decision [(ROD)] or FONSI) for renewing contracts of the Sacramento River, San Luis, and Delta-Mendota Canal divisions, the Sacramento River Settlement Contracts, and several individual contracts. Preparation of environmental documents for other divisions and contracts are ongoing. In addition, Reclamation has completed a Draft EIS for renewing contracts within the American River Division, which includes the Folsom Unit, Sly Park Unit, and Auburn-Folsom South Unit of the CVP. The proposed contracts with the EID, East Bay Municipal Utility District, PCWA, the City of Roseville, SMUD, Sacramento County Water Agency, and SJWD are for delivery of up to about 330,000 AFA of CVP water for M&I uses for an additional 40 years. The EIS and associated ROD are required to execute CVP water service contracts with PCWA (35,000 AFA) and Roseville (32,000 AFA).

CALFED Bay-Delta Program

The CALFED Bay-Delta Program (CALFED Program) is a collaborative effort of 23 federal and state agencies focusing on restoring the ecological health of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Estuary) while ensuring water quality improvements and water supply reliability to all users of the Bay-Delta water resources (CALFED 2000b). The CALFED Program includes a range of balanced actions that can be taken forward to a comprehensive, multi-agency approach to managing Bay-Delta resources. The Bay-Delta watershed includes the Sacramento and San Joaquin rivers and tributaries (e.g., Feather and lower American rivers).

Environmental Water Account

The Environmental Water Account (EWA), as described in the CALFED ROD, is a key component of CALFED's water management strategy. Created to address the problems of declining fish populations and water supply reliability, the EWA is an adaptive management tool that aims to protect both fish and water users as it modifies water project operations in the Bay-Delta. The EWA provides water for the protection and recovery of fish beyond that which would be available through the existing baseline of regulatory protection related to project operations. The EWA buys water from willing sellers or diverts surplus water when safe for fish, then banks, stores, transfers and releases it as needed to protect fish and compensate water users for deferred diversions (USFWS 2004b).

To date, EWA actions taken to benefit at-risk native fish species range from CVP/SWP export pumping curtailments, which directly reduce incidental take at the CVP and SWP pumps in the South Delta, to augmenting instream flows and Delta outflows. Beneficial changes in SWP and CVP operations could include changing the timing of water exports from Delta pumping plants

to coincide with periods of greater or lesser vulnerability of various fish species to environmental conditions in the Delta. For example, EWA might alter the timing of water diversions from the Delta and carry out water transfers to reduce fish entrainment at the pumps and provide for migratory cues for specific anadromous fish species.

Steelhead Restoration and Management Plan of California

The goals for steelhead restoration and management outlined in CDFG's 1996 Steelhead Restoration and Management Plan for California are: (1) to increase natural production, as mandated by The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988, in an attempt to create self-sustaining steelhead populations and maintain them in good condition; and (2) to enhance opportunities for angling and non-consumptive uses.

The Steelhead Restoration and Management Plan focuses on the restoration of native and wild stocks because these stocks have the greatest value insofar as maintaining genetic and biological diversity. Suggested strategies to accomplish these two goals include restoring degraded habitat, restoring access to historic habitat that is currently blocked, reviewing angling regulations to ensure that steelhead adults and juveniles are not over-harvested, maintaining and improving hatchery runs, where appropriate, and developing and facilitating research to address deficiencies in information on fresh water and ocean life history, behavior, habitat requirements, and other aspects of steelhead biology.

Water Forum Fish and In-Stream Habitat Plan

The Water Forum Fish and In-Stream Habitat Plan (FISH Plan) identifies and prioritizes opportunities for improving the health of the lower American River fish and aquatic habitats, including both new initiatives and modifications to existing management practices. It also identifies key data gaps and research efforts needed to address these gaps. A critical component of the FISH Plan is the strategy for assessing the effectiveness of the recommended restoration actions through monitoring, data interpretation, and adaptive adjustments. As new data regarding the health of the lower American River become available, the FISH Plan will be refined and updated to reflect new insights.

The FISH Plan constitutes a single blueprint of management and restoration actions for enhancement of lower American River fisheries and in-stream habitat. Management and restoration actions presented in the FISH Plan for improvement of water temperature within the lower American River include: developing and implementing a basin-wide temperature modeling program; evaluating the effectiveness of coldwater pool management at Folsom Dam and Reservoir through a variety of methods; constructing and operating a temperature control device for EID; accessing coldwater between the lower river outlet works and the penstocks to address the needs of priority lower American River fish species; and improving efficiency of water transport through Lake Natoma (e.g., modifying channel in Lake Natoma).

The FISH Plan serves as the aquatic HME for a multi-agency River Corridor Management Plan that was funded by CALFED during January 2000. It also is intended to serve as the HME for the lower American River, as required under the Sacramento Area Water Forum Agreement, consistent with the mitigation described and certified in the WFA EIR and adopted Mitigation, Monitoring, and Reporting Plan (MMRP).

A Plan for Action

In 1993, CDFG published Restoring Central Valley Streams: A Plan for Action, which was developed to address the protection of anadromous fish habitat in Central Valley streams (CDFG 1993). This plan identified the following five priorities for the lower American River, and establishes them as recommendations:

- Maintain specified instream flow releases below Nimbus Dam throughout the year.
- Establish minimum fall carryover storage at Folsom Reservoir to maintain suitable year-round stream water temperatures.
- Control rapid-flow fluctuations to protect eggs and fry of anadromous fish.
- Develop a coordinated multi-agency management plan.
- Develop and implement a continuing program for the purpose of restoring and replenishing, as needed, spawning gravel lost from the construction and operation of the CVP dams, bank protection projects, and other actions that have reduced the availability of spawning gravel and rearing habitat in the lower American River.

Steelhead Restoration Plan for the American River

In 1991, CDFG published the Steelhead Restoration Plan for the American River. This plan has two main objectives (CDFG 1991):

- Restoring and maintaining naturally produced steelhead as an integral component of the American River ecosystem; and
- Restoring the population to a level that will sustain a quality steelhead fishery and provide for other non-consumptive uses.

This plan focuses on restoring habitat conditions within the American River, and on supplementing the existing fisheries population with artificially reared fish. The plan also recommends that the overall CVP operations be adjusted to allow for the elimination of drastic flow fluctuations in the American River; states water temperature objectives during spawning, incubation, emergence, juvenile rearing life stages; and suggests maintenance of a minimum coldwater pool in Folsom Reservoir throughout the summer.

Lower American River Corridor Management Plan

The Lower American River Corridor Management Plan (RCMP) serves to promote a cooperative approach to managing and enhancing the lower American River within the framework of the 1985 American River Parkway Plan. The goals outlined in the plan are to protect and enhance fisheries and in-stream habitat, protect and enhance vegetation and wildlife habitat, improve the reliability of the existing flood control system, and enhance the lower American River's wild and scenic recreation values.

American River Operations Group

Reclamation and DWR work closely with USFWS, CDFG, and NMFS to coordinate the operation of the CVP and SWP with fishery needs. To achieve this coordination, Reclamation formed the American River Operations Group (AROG) in 1996. The AROG is an operational working group for the lower American River that provides recommendations to Reclamation on

the timing and release of flows from Folsom Reservoir for the protection of aquatic resources in the lower American River. This advisory group is open to the public and generally includes representatives from Reclamation, DWR, USFWS, CDFG, NMFS, SAFCA, Water Forum, City of Sacramento, County of Sacramento, and other stakeholders. The AROG meets once a month, or more frequently when needed, with the goal of providing fishery updates and information to Reclamation to better manage Folsom Reservoir operations.

3.4.2 French Meadows and Hell Hole Reservoirs

French Meadows and Hell Hole reservoirs are mid-elevation Sierra Nevada reservoirs (having elevations of approximately 5,000 feet above msl) that support coldwater recreational fisheries for resident rainbow and brown trout (*Oncorhynchus mykiss* and *Salmo trutta*). CDFG stocks French Meadows Reservoir with rainbow and brown trout in June and July and Hell Hole Reservoir once a year. Warmwater fisheries also exist in both reservoirs and include smallmouth bass, catfish, and sunfish. Fish production in these reservoirs is limited by large seasonal fluctuations in water levels and low productivity compared to natural lakes. French Meadows Reservoir supports a self-sustaining population of brown trout that migrates from the reservoir to spawning areas in the Middle Fork American River above the reservoir during the fall. No physical barriers to brown trout migration are present in the Middle Fork American River within two miles above the reservoir during the fall (PCWA 2001).

3.4.3 Middle Fork American River

The Middle Fork American River supports coldwater fish species year-round. The primary sport species in the Middle Fork American River reportedly are resident rainbow and brown trout (PCWA 2001). In addition to rainbow and brown trout, fish sampling surveys of the Middle Fork American River conducted by the USFWS in 1989 from Ralston Afterbay, downstream to the confluence with the North Fork American River, documented the presence of hitch (*Lavinia exilicauda*), Sacramento sucker (*Catostomus occidentalis*), Sacramento pikeminnow (*Ptychocheilus grandis*), and riffle sculpin (*Cottus gulosus*) (Corps 1991). No special-status fish species are reported to occur in the Middle Fork American River.

Brown trout are resident stream fish, spending their entire life cycle in fresh water. Spawning generally occurs during November and December in California. Brown trout fry typically hatch in seven to eight weeks, depending on water temperature, with emergence of young three to six weeks later (Moyle 2002). Optimal riverine habitat for brown trout reportedly consists of cool to coldwater, silt-free rocky substrate, an approximate 1:1 pool-to-riffle ratio, and relatively stable water flow and temperature regimes (Raleigh *et al.* 1986b). Moyle (2002) reported that while brown trout will survive for short periods at temperatures in excess of 82.4°F to 84.2°F (28°C to 29°C), optimum temperatures for growth range from 62.6°F to 64.4°F (17°C to 18°C). Brown trout tend to utilize lower reaches of low to moderate gradient areas (less than one percent) in suitable, high gradient rivers (Raleigh *et al.* 1986b).

The Middle Fork American River sustains a popular rainbow trout fishery. As with brown trout, rainbow trout also are resident stream fish whose optimal riverine habitat reportedly consists of coldwater, silt-free rocky substrate, a 1:1 pool-to-riffle ratio, and relatively stable water flow and temperature regimes (Raleigh and Duff 1980). Moyle (2002) reported that while rainbow trout will survive temperatures up to 80.6°F (27°C), optimum temperatures for growth and completion of most life stages reportedly range from 59°F to 64.4°F (15°C to 18°C).

Rainbow trout spawning generally occurs from February to June. Rainbow trout fry emerge from spawning gravels approximately 35 to 49 days after spawning, depending on water temperatures (Moyle 2002).

Warmwater species generally have wider thermal tolerance ranges and generally broader habitat preferences than salmonids and other coldwater species. Specifically, warmwater species such as Sacramento pikeminnow and Sacramento sucker typically are found together in low- to mid-elevation streams and rivers with deep pools, long runs, undercut banks and overhanging vegetation. They generally live in waters with summer water temperatures of approximately 59°F to 64.4°F (15°C to 18°C), to 82.4°F to 86°F (28°C to 30°C) (Moyle 2002). Many other warmwater species including a variety of minnows and basses exhibit similarly wide ranges within their habitat and thermal requirements.

Aerial surveys conducted in conjunction with the Ralston Afterbay Sediment Management Project revealed that the Middle Fork American River above Oxbow Reservoir consists of steep, bedrock-controlled reaches that generally lack distinct alluvial features such as gravel bars and riffles (PCWA 2002). Downstream of Oxbow Reservoir, the Middle Fork American River is comprised of a dominant pool-riffle channel morphology, smaller average substrate size, and larger quantities of fine sediment. During 2001, riffle substrates were characterized as being in moderate to good condition based on the general habitat requirements of trout and aquatic invertebrates (PCWA 2002).

Little information is available on fish populations in the Middle Fork American River below Oxbow Reservoir, but trout production has been suggested to be relatively low because of large daily fluctuations in flow associated with hydroelectric peaking operations at Oxbow Powerhouse (PCWA 2001). The current FERC license for the MFP provides that the Oxbow Power Plant releases to the Middle Fork American River shall not cause vertical fluctuations in stream stages (measured in a representative section) greater than one foot per hour. However, such fluctuations have the potential to affect stream productivity, especially during periods when flows would otherwise be fairly stable (i.e., summer and early fall). Hydropower peaking operations can adversely affect stream communities because of unstable habitat conditions in which benthic algae, invertebrates, and fish are frequently subjected to exposure, stranding, and/or displacement from preferred habitats. Stranding and isolation of aquatic organisms from the flowing portion of the stream can lead to increased mortality due to exposure to direct solar radiation, elevated water temperatures, low dissolved oxygen, and predation (PCWA 2001).

3.4.4 North Fork American River

Downstream of its confluence with the Middle Fork, the North Fork American River supports warmwater fish species year-round, including smallmouth bass (*Micropterus dolomieu*), Sacramento pikeminnow, Sacramento sucker, riffle sculpin, brown bullhead (*Ictalurus nebulosus*), and green sunfish (*Lepomis cyanellus*). Although some rainbow and brown trout are present, summer and fall water temperatures are generally too warm for significant spawning and early-life stage rearing of trout. The majority of trout that do occur in the North Fork American River below the confluence with the Middle Fork American River are believed to be transitory downstream adult and/or sub-adult migrants that have dispersed into the area from upstream habitats (i.e., Middle Fork American River). No special-status fish species are reported to occur in the North Fork American River.

There is little available information on fish populations and benthic macroinvertebrate communities in this reach of the North Fork American River. However, aquatic habitat requirements for cold and warmwater fish species are similar to those previously described for the Middle Fork American River.

3.4.5 Folsom Reservoir

Strong thermal stratification occurs within Folsom Reservoir annually between April and November. Thermal stratification establishes a warm surface water layer (epilimnion), a middle water layer characterized by decreasing water temperature with increasing depth (metalimnion or thermocline), and a bottom, coldwater layer (hypolimnion) within the reservoir. In terms of aquatic habitat, the warm epilimnion of Folsom Reservoir provides habitat for warmwater fishes, whereas the reservoir's lower metalimnion and hypolimnion form a "coldwater pool" that provides habitat for coldwater fish species throughout the summer and fall portions of the year. Hence, Folsom Reservoir supports a "two-story" fishery during the stratified portion of the year (April through November), with warmwater species using the upper, warmwater layer and coldwater species using the deeper, colder portion of the reservoir.

Native species that occur in the reservoir include hardhead (*Mylopharodon conocephalus*) and Sacramento pikeminnow. However, introduced largemouth bass (*Micropterus salmoides*), smallmouth bass, spotted bass (*Micropterus punctulatus*), bluegill (*Lepomis macrochirus*), black and white crappie (*Pomoxis nigromaculatus* and *P. annularis*), and catfishes (*Ictalurus* spp. and *Ameiurus* spp.) constitute the primary warmwater sport fisheries of Folsom Reservoir. The coldwater sport species present in the reservoir include rainbow and brown trout, kokanee salmon (*Oncorhynchus nerka*), and Chinook salmon, all of which are currently or have been stocked by CDFG. Although brown trout are no longer stocked, a population still remains in the reservoir. Because these coldwater salmonid species are stream spawners, they do not reproduce within Folsom Reservoir. However some spawning by one or more of these species may occur in the North Fork American River upstream of Folsom Reservoir.

Folsom Reservoir's coldwater pool is important not only to the reservoir's coldwater fish species identified above, but also is important to lower American River fall-run Chinook salmon and Central Valley steelhead. Seasonal releases from the reservoir's coldwater pool provide thermal conditions in the lower American River that support annual in-river production of these salmonid species. However, Folsom Reservoir's coldwater pool is not large enough to facilitate coldwater releases during the warmest months (July through September) to provide maximum thermal benefits to over-summering juvenile steelhead rearing in the lower American River, and coldwater releases during October and November that would maximally benefit fall-run Chinook salmon immigration, spawning, and embryo incubation. Consequently, management of the reservoir's coldwater pool on an annual basis is essential to providing thermal benefits to both fall-run Chinook salmon and steelhead, within the constraints of coldwater pool availability.

Hydrologic conditions associated with the Proposed Action would not be expected to alter the existing operational pattern of releases from Folsom Dam and, thus, storage and surface water elevation in Folsom Reservoir would not be expected to change as a result of the project, relative to existing conditions. Because potential effects on warmwater and coldwater reservoir fish species are typically evaluated by considering the frequency and magnitude of fluctuating

reservoir conditions (e.g., surface water elevation, littoral habitat availability, and storage), no such effects on resident fish species found in Folsom Reservoir would be expected to occur. Consequently, no quantitative assessment of potential storage- or surface water elevation-related effects on fisheries resources in this water body is warranted.

3.4.6 Lake Natoma

Lake Natoma supports many of the same fisheries found in Folsom Reservoir (rainbow trout, bass, sunfish, and catfish). Some recruitment of warmwater and coldwater fishes likely comes from Folsom Reservoir. In addition, CDFG stocks Lake Natoma with catchable-sized rainbow trout annually. Although supporting many of the same fish species found in Folsom Reservoir, Lake Natoma's limited primary and secondary production, colder epilimnetic water temperatures (relative to Folsom Reservoir), and daily elevation fluctuations are believed to reduce the size and annual production of many of its fish populations, relative to Folsom Reservoir (USFWS 1991). Lake Natoma's characteristics, coupled with limited public access, result in its lower angler use compared to Folsom Reservoir.

Lake Natoma was constructed to serve as a regulating afterbay for Folsom Reservoir. Despite its size (an operating range of 2,800 AF), Lake Natoma can influence the temperature of water flowing through it. High residence times in the lake, particularly during summer months, have a warming effect on water released from Folsom Reservoir. Water is released from Lake Natoma into the lower American River below Nimbus Dam.

As a regulating afterbay of Folsom Reservoir, monthly storage and surface water elevation in Lake Natoma fluctuate significantly on a daily and hourly basis within the range of normal operating conditions. Because the Proposed Action would not change the current pattern of upstream releases from Folsom Dam, which serve as inflow into Lake Natoma, no storage- or surface water elevation-related effects on the fisheries resources in Lake Natoma would be anticipated to occur, relative to existing conditions. Consequently, no quantitative assessment of potential storage- or surface water elevation-related effects on fisheries resources in this water body is warranted.

3.4.7 Nimbus Fish Hatchery

CDFG operates the Nimbus Salmon and Steelhead Hatchery and the American River Trout Hatchery, which produce anadromous fall-run Chinook salmon and steelhead, and non-anadromous rainbow trout, respectively. Both of these hatcheries are located at the same facility immediately downstream of Nimbus Dam. Each year, nearly four million salmon produced by the Nimbus Hatchery are trucked and released into the Sacramento River-San Joaquin Estuary. Steelhead are released into the Sacramento River at either Miller Park or Garcia Bend. Trout are stocked in numerous water bodies throughout the region.

The Nimbus Hatchery receives water for its operations directly from Lake Natoma via a 60-inch-diameter pipeline. Water temperatures in the hatchery are dictated by the temperature of water diverted from Lake Natoma, which in turn, is primarily dependent upon several factors including the temperature of water released from Folsom Reservoir, ambient air temperature, and retention time in Lake Natoma. The temperature of water diverted from Lake Natoma for hatchery operations is frequently higher than that which is generally desired for hatchery production of salmonids. Under such conditions, more suitable water temperatures may be

achieved by increasing releases at Folsom Dam and/or releasing colder water from a lower elevation within Folsom Reservoir. However, seasonal releases from Folsom Reservoir's limited coldwater pool to benefit hatchery operations must be considered in conjunction with seasonal in-river benefits from such releases.

3.4.8 Lower American River

The American River drains a watershed of approximately 1,895 square miles and is a major tributary to the Sacramento River. With over 125 miles of upstream riverine habitat available to anadromous and resident fish, the American River historically served as a regionally vital component for the reproduction and survival of fall- and spring-run Chinook salmon (Water Forum 2001). While development and dam construction reportedly extirpated the spring-run fishery, the lower American River continues to function as spawning and rearing habitat for large numbers of fall-run Chinook salmon and supports a mixed run of hatchery and naturally produced fish (Yoshiyama *et al.* 2001). Presently, use of the American River by anadromous fish is limited to the 23 miles of river below Nimbus Dam (i.e., the lower American River).

The lower American River provides a diversity of aquatic habitats, including shallow, fast-water riffles, glides, runs, pools, and off-channel backwater habitats. The lower American River from Nimbus Dam (river mile [RM] 23) to approximately Goethe Park (RM 14) is primarily unrestricted by levees, but is bordered by some developed areas. The river reach downstream of Goethe Park, and extending to its confluence with the Sacramento River (RM 0), is bordered by levees. The construction of levees changed the channel geomorphology and has reduced river meanders and increased depth.

At least 43 species of fish have been reported to occur in the lower American River system, including numerous resident native and introduced species, as well as several anadromous species. Although each fish species fulfills an ecological niche, several species are of primary management concern either as a result of their declining status or because of their importance as a recreational and/or commercial fishery.

Special-status[4] fish species within the lower American River include Central Valley steelhead, spring-run Chinook salmon, and fall-run/late-fall-run Chinook salmon. Central Valley steelhead are listed as a threatened species under the federal ESA and have no CESA or CDFG status. The lower 10 miles of the American River has been designated as critical habitat for spring-run Chinook salmon. Fall-run/late fall-run Chinook salmon[5] is a federal species of concern, and late fall-run Chinook salmon is considered a state species of special concern by

[4] Special-status fish species are those having designated critical habitat and/or are listed, proposed for listing, or candidate species under the federal or state endangered species acts, a managed species under the MSFCMA, and/or a federal or state species of concern.

[5] NMFS recognizes the late-fall-run Chinook salmon in the Central Valley fall-run Evolutionarily Significant Unit (ESU) (Moyle 2002). On April 15, 2004, NMFS published a notice in the Federal Register acknowledging establishment of a species of concern list, addition of species to the species of concern list, description of factors for identifying species of concern, and revision of the candidate species list. In this notice, NMFS announced the Central Valley Fall-run and Late Fall-run Chinook Salmon ESU change in status from a candidate species to a species of concern. In 1999, the Central Valley ESU underwent a status review after NMFS received a petition for listing. Pursuant to that review, NMFS found that the species did not warrant listing as threatened or endangered under the ESA, but sufficient concerns remained to justify addition to the candidate species list. Therefore, according to NMFS' April 15, 2004 interpretation of the ESA provisions, the Central Valley ESU now qualifies as a species of concern, rather than a candidate species (69 FR 19977).

CDFG. Chinook salmon also is a federally managed fish species under the MSFCMA. Recreationally and/or commercially important anadromous species include fall-run Chinook salmon, steelhead, striped bass, and American shad. A variety of centrarchid species including black bass also are recreationally important.

3.4.9 Long-Term Warren Act Service Area

Aquatic habitats within the long-term WA service area are associated with streams such as Dry Creek, Arcade Creek, Cripple Creek, Magpie Creek, Goat Creek, and Rio Linda Creek. These waterways support submergent vegetation within the channel and emergent vegetation along the stream banks. Of these streams, only Dry Creek has previously been identified as supporting both Chinook salmon and steelhead fisheries. Dry Creek is noteworthy for having one of the only documented salmon runs of area creeks (County of Sacramento Department of Regional Parks, Recreation and Open Space 2002) and has been designated as critical habitat for Central Valley steelhead (70 FR 170). Arcade and Cripple creeks are not known to contain anadromous fishes despite both streams maintaining perennial flows. The smaller aforementioned creeks are all tributary streams and are not known to contain anadromous fishes.

According to DFG and field surveys conducted for Sacramento County, at least 13 species of fish are commonly found in the reaches of Dry Creek that pass through the Dry Creek Parkway Recreational Master Plan area. Fish in Dry Creek include fall-run Chinook salmon, steelhead, mosquito fish (*Gambusia affinis*), common carp (*Cyprinus carpio*), Sacramento sucker, brown bullhead, tule perch (*Hysterocarpus traski*), hitch (*Lavinia exilicauda*), threadfin shad (*Dorosoma petenense*), Pacific lamprey (*Lampetra tridentata*), bluegill (*Lepomis macrochirus*), green sunfish, and largemouth bass (County of Sacramento Department of Regional Parks, Recreation and Open Space 2002).

3.4.10 Species Occurrence within the Action Area

Information sources used to identify fish species of primary management concern with the potential to occur within the action area include USFWS species lists, CDFG California Natural Diversity Data Base (CNDDB) RAREFIND queries, and published data collected by various sources including regulatory agencies, water agencies, environmental consultants, and academic institutions. Fish species of primary management concern include special-status species, as well as recreationally and/or commercially important anadromous species. Species of primary management concern occurring in the lower American River include:

- Central Valley steelhead;
- Spring-run Chinook salmon
- Fall-run Chinook salmon;
- Striped bass; and
- American shad.

Because species of primary management concern are sensitive to changes in flow and water temperature throughout the year, an evaluation of effects on these species is believed to reasonably encompass the range of potential effects to lower American River fisheries resources that could result from implementation of the Proposed Action. No special-status fish species

occur within the Middle Fork and North Fork American rivers. Special-status fish species reported to occur within the long-term WA service area include:

- Central Valley steelhead; and
- Fall-run Chinook salmon.

The federally and state listed, proposed listed, and candidate species under the federal or state endangered species acts, and EFH-managed fish species that occur, or have the potential to occur, within the action area are listed in **Table 3-1** (see section entitled Magnuson-Stevens Fishery Conservation and Management Act in Chapter 5 for further information on EFH-managed fish species). Appendix B contains USFWS and CNDDB lists of special-status species that occur, or have the potential to occur, within the action area, including federal and state species of concern.

Populations of spring-run Chinook salmon were previously assumed to be restricted to accessible reaches in the upper Sacramento River mainstem, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and the Yuba River (CALFED 2000b; CDFG 1998; 218 FR 68725 (2002); 6 FR 1116 (2002); USFWS 1998). However, spring-run Chinook salmon juveniles have been observed rearing in non-natal tributaries and intermittent streams during winter months (NMFS 2004), and the lower 10 miles of the American River has been designated as critical habitat for spring-run Chinook salmon (see Section 5.5.1 for further information). Critical habitat considerations for spring-run Chinook salmon are addressed in the analysis for fall-run Chinook salmon and steelhead in the lower American River.

Since completion of Shasta Dam, the Sacramento River, Battle Creek, and Calaveras River are the only habitats where winter-run Chinook have been known to occur (NMFS 1999; USFWS 1987). The only known spawning population for green sturgeon in California occurs in the Sacramento and Klamath rivers, (Moyle 2002, NMFS 2002). CDFG (2002) suggests that the Southern DPS green sturgeon spawn and rear for the first two months between Keswick Dam (RM 302) and Hamilton City. In addition, green and white sturgeon occasionally enter the Feather River system, but intensive sampling in recent years has found no evidence of spawning and there is no data that spawning occurs now or occurred in the historical time frame (Beamesderfer et al. 2004). No current use by sturgeon of Sacramento River tributaries, other than the Feather River system, has been reported (Beamesderfer et al. 2004, Moyle 2002). Therefore, winter-run Chinook salmon and green sturgeon are not included in the species-specific assessments for the lower American River.

Green sturgeon, delta smelt, winter-run Chinook salmon, and spring-run Chinook salmon are included in Table 3-1 because they are included in the USFWS species lists as potentially occurring within several USGS quadrangles within which the action area is located.

Table 3-1. Federally and state listed, proposed listed, candidate, and EFH-managed fish species potentially occurring within the action area.

Species	Common Name	Status Federal[1]/State[2]
Acipenser medirostris	Green sturgeon[3]	PT/CSC
Hypomesus transpacificus	Delta smelt	T/ST
Oncorhynchus mykiss	Central Valley steelhead	T/--
Oncorhynchus tshawytscha	Fall-run/late fall-run Chinook salmon[4]	SC/CSC
Oncorhynchus tshawytscha	Winter-run Chinook salmon	E/SE
Oncorhynchus tshawytscha	Spring-run Chinook salmon	T/ST

1 Federal Status: E=Endangered; T=Threatened; P=Proposed Endangered or Threatened; C=Candidate; FPD/T = Federally proposed for De-listing as Threatened; SC=Species of Concern

2 State Status: SE=Endangered; ST=Threatened; CSC=Species of Special Concern

3 The southern population of North American green sturgeon is proposed for listing as threatened effective July 6, 2006.

4 NMFS recognizes the late-fall-run in the Central Valley fall-run Chinook salmon Evolutionarily Significant Unit (ESU). On April 15, 2004, NMFS announced the Central Valley fall-run and late fall-run Chinook Salmon ESU change in status from a candidate species to a species of concern. Fall-run/late fall-run Chinook salmon is a federally managed fish species for EFH in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.

Source: CDFG CNDDB, USFWS species list; and NMFS correspondence (see Appendix B)

Central Valley Steelhead

The Central Valley Steelhead ESU is listed as "threatened" under the federal ESA, and has no listing status under the California ESA. Naturally spawning populations are known to occur in the lower American River, but are believed to have substantial hatchery influence and their ancestry is not clearly known (Busby *et al.* 1996). Additionally, steelhead runs in the lower American River are sustained largely by Nimbus Hatchery (McEwan and Jackson 1996).

Adult steelhead immigration into Central Valley streams typically begins in December and continues into March. Steelhead immigration generally peaks during January and February (Moyle 2002). Optimal immigration water temperatures have been reported to range from 46°F to 52°F (7.8°C to 11.1°C) (CDFG 1991). Spawning usually begins during late-December and may extend through March, but also can range from November through April depending on environmental variables such as seasonal flows and water temperatures (CDFG 1986b). Optimal water temperatures for steelhead spawning activities have been reported to range from 39°F to 52°F (3.9°C to 11.1°C) (CDFG 1991). Unlike Chinook salmon, many steelhead do not die after spawning. Those that survive return to the ocean, and may spawn again in future years.

Optimal water temperatures for egg and fry incubation have been reported to range from 48°F to 52°F (8.9°C to 11.1°C), while optimal water temperatures for fry and juvenile rearing is reported to range from 45°F to 60°F (7.2°C to 15.6°C) (CDFG 1991). Water temperatures up to 65°F (18.3°C) are believed to be suitable for steelhead rearing. Each degree increase between 65°F and the reported upper lethal limit of 75°F (23.9°C) becomes increasingly less suitable and thermally more stressful for rearing individuals (Bovee 1978). The primary period of steelhead emigration in the American River reportedly occurs from March through June (Castleberry *et al.* 1991).

Fall-run/Late Fall-run Chinook Salmon

Chinook salmon in the Central Valley exhibiting fall- and late fall-run behavior (i.e., immigration timing) are considered by NMFS to be one ESU, the Central Valley fall and late fall-run ESU. Therefore, both runs will be addressed simultaneously in this evaluation. Fall-run/late fall-run Chinook salmon are of recreational/commercial importance as well as a species of concern under the federal ESA. Additionally, the fall-run/late fall-run Chinook salmon ESU is a federally managed fish species for EFH in accordance with the MSFCMA. Although this species has no formal listing status under the California ESA, it is considered a species of special concern by CDFG.

Although considered a single ESU with late fall-run Chinook salmon, fall-run Chinook salmon (i.e., Chinook salmon exhibiting fall-run behavior) have been the dominant run in the lower American River since the 1940s (Water Forum 2001). Adult fall-run Chinook salmon begin migrating upstream annually in August and September, with immigration continuing through December in most years and through January during some years. Adult immigration activities generally peak in November, and typically, greater than 90 percent of the run has entered the lower American River by the end of November (Snider and McEwan 1992; Snider and Vyverberg 1995). The immigration timing of fall-run Chinook salmon tends to be temporally similar from year-to-year because it is largely dictated by environmental and internal cues (e.g., photoperiod, gonadal maturation, and other seasonal environmental cues) that exhibit little year-to-year variation.

The timing of adult Chinook salmon spawning activity is strongly influenced by water temperature. When daily average water temperatures decrease to approximately 60°F (15.6°C), female fall-run Chinook salmon begin to construct nests (redds) into which their eggs are deposited and simultaneously fertilized by the male. The female subsequently buries fertilized eggs with streambed gravel. Due to the timing of adult arrivals and occurrence of appropriate spawning water temperatures, spawning activity in recent years in the lower American River, for example, has peaked during mid- to late-November (Snider and McEwan 1992; Snider and Vyverberg 1995).

The intragravel residence period of incubating eggs and alevins (yolk-sac fry) is highly dependent upon water temperature and generally extends from about mid-October through March. Egg incubation survival rates are dependent on water temperature and intragravel water movement. CDFG (1980) reported egg mortalities of 80 percent and 100 percent for Chinook salmon at water temperatures of 61°F and 63°F (16.1°C and 17.2°C), respectively. Egg incubation survival is reportedly highest at water temperatures at or below 56°F (13.3°C) (USFWS 1995; USFWS 1999b).

Within the lower American River, fall-run Chinook salmon fry emergence generally occurs from late-December through mid-May. Water temperatures between 45°F and 58°F (7.2°C and 14.4°C) have been reported to be optimal for rearing of Chinook salmon fry and juveniles (Reiser and Bjornn 1991; Rich 1987). Raleigh *et al.* (1986a) reviewed available literature on Chinook salmon thermal requirements and suggested a suitable rearing water temperature upper limit of 75°F (23.9°C) and a range of approximately 53.6°F to 64.4°F (12°C to 18°C).

In the Sacramento River Basin, fall-run Chinook salmon juvenile emigration occurs from January through July (Vogel and Marine 1991; Yoshiyama *et al.* 1998). Emigration surveys

conducted by CDFG have shown no evidence that peak emigration of fall-run Chinook salmon is related to the onset of peak spring flows in the lower American River (Snider *et al.* 1997). Water temperatures required during emigration are believed to be about the same as those required for successful rearing.

American Shad

Because of its importance as a sport fishery, American shad have been the subject of several CDFG investigations in the Central Valley (Moyle 2002). In contrast to salmonids, distributions of spawning American shad are determined by river flow rather than by homing behavior (Painter *et al.* 1979). The majority of adult American shad spawning migrations into the lower American River are believed to be largely influenced by flows at the mouth of the river, and are reported to occur primarily during May and June (CDFG 1991). Snider (1986) recommended flow levels of 3,000 cfs to 4,000 cfs in the lower American River during May and June as sufficient attraction flows to sustain the river's American shad fishery.

Water temperature is an important factor influencing the timing of American shad spawning activities, with reported water temperatures suitable for spawning ranging from approximately 46°F to 79°F (7.8°C to 26.1°C) (USFWS 1967), although optimal spawning temperatures are reported to range from 60°F to 70°F (15.6°C to 21.1°C) (Bell 1991; CDFG 1980; Leggett and Whitney 1972; Painter *et al.* 1979; Rich 1987). When suitable spawning conditions are found, American shad school and broadcast their eggs throughout the water column. The optimal water temperature for egg development reportedly occurs at 62°F (16.7°C), at which eggs hatch in six to eight days (MacKenzie *et al.* 1985). At water temperatures near 75°F (23.9°C), eggs would hatch in three days (MacKenzie *et al.* 1985). Egg incubation and hatching, therefore, are coincident with the primary spawning period of May through June. Although some fish will reside in rivers and estuaries up to one year before entering the ocean, juvenile American shad generally migrate downstream towards the ocean during late summer and fall, with most fish migrating to the open ocean before winter (i.e., December) (CALFISH Website 2005; Fry 1973).

Striped Bass

Striped bass historically have been one of the most important sport fisheries in California, especially in the Delta and in the lower Sacramento River (Fry 1973). Although no studies have definitively determined whether striped bass spawn in the lower American River (CDFG 1971; CDFG 1986b; DWR 2001) it is believed that little, if any, spawning occurs in the lower American River, and that adult fish which entered the river probably spawned elsewhere or not at all (DeHaven 1978; DeHaven 1977). Nevertheless, juvenile striped bass utilize the lower American River for rearing, and juvenile striped bass have been reported to be abundant in the river during the fall (DeHaven 1977). Additionally, the river supports a striped bass sport fishery during May and June. Optimal water temperatures for juvenile striped bass rearing have been reported to range from approximately 59°F to 68°F (15°C to 20°C) (Moyle 2002). Juvenile striped bass are reported to move downstream to estuarine portions of rivers in the late summer or early fall. In addition to juvenile rearing considerations, the number of adult striped bass entering the lower American River during the summer is believed to vary with flow levels and food production (CDFG 1986b).

3.5 TERRESTRIAL AND RIPARIAN RESOURCES

The analysis of potential effects on terrestrial and riparian resources includes a discussion of general conditions, specific habitats, and special-status[6] species that occur within the long-term WA service area, along the riparian corridors of the Middle Fork, North Fork, and lower American rivers, and associated with reservoirs in those areas potentially affected by the Proposed Action.

3.5.1 Regulatory Setting

Federally protected endangered and threatened riparian and terrestrial species in the action area are under the jurisdiction of the USFWS. Projects involving a federal agency require consultation with the USFWS under Section 7 of the ESA (16 U.S.C. § 1536). California State endangered and threatened species and those species being considered for listing (candidate species) within the action area are regulated under the CESA by CDFG. CEQA requires review of projects to ensure that they would not jeopardize the continued existence of endangered, threatened, and candidate species or their habitats (California Fish and Game Code § 2090 et seq.). The CEQA process for this project included preparation of the Groundwater Stabilization EIR, which addressed potential effects on state listed species (PCWA and NWD 1999).

The project proponent is obligated to fulfill the requirements described under Section 7 of the ESA and Section 2090-2095 of the California Fish and Game Code. Compliance with both ESA and CESA requires a determination of the presence/absence of listed species within the action area and an evaluation of the potential of the project to adversely affect those species through secondary indirect growth-related impacts.

Wetlands are regulated by the Corps under Section 404 of the Clean Water Act (CWA) (33 U.S.C. § 1251 et seq.). Impacts to greater than three acres of jurisdictional wetlands or "waters of the United States" would require an individual permit form the Corps while impacts less than three acres likely would be eligible for coverage under an existing Nationwide Permit.

Land Use Regulations and Management Plans

Sacramento County and the City of Citrus Heights have land use authority for all development projects occurring within their respective jurisdictions. New development projects within the long-term WA service area would undergo project level environmental review in accordance with CEQA through the Sacramento County or City of Citrus Heights approval processes.

Sacramento County

Sacramento County has land use authority for all development projects occurring within its jurisdiction. The authority ultimately resides with the Sacramento County Board of Supervisors; however, it is facilitated through the Sacramento County Planning and Development Department. Additionally, the Sacramento County Department of Environmental Review (DERA) reviews all development projects within Sacramento County. Accordingly, all new development projects within the long-term WA service area, with the exception of those located within the City of Citrus Heights, would undergo project-level environmental review by DERA in accordance with CEQA.

[6] Special-status terrestrial and riparian species are those that are listed, proposed for listing, or candidate species under the federal or state endangered species acts, and/or federal or state species of concern.

Depending on the level of significance for any impacts identified, appropriate mitigation measures are developed through coordination with the project applicant, DERA, and various public trust resource agencies. Input from public trust resource agencies in almost all cases includes comments received from the USFWS and CDFG for development-related projects. The development of a mitigation monitoring program (including reporting requirements) consistent with Section 21086.6 of CEQA is administered by DERA to ensure compliance during project implementation.

The Conservation Element of the Sacramento County General Plan (General Plan) is the guiding document ensuring that land use planning within Sacramento County is properly integrated with effective conservation practices (Sacramento County 1993). Should urban development potentially result in impacts to natural terrestrial habitats and/or sensitive species, these policies exist to direct conservation, mitigation, and post-project monitoring efforts. Examples of policies set forth in the General Plan are provided below.

General Plan policies CO-78 through CO-101 address development issues involving areas of vernal pools, mitigation banking for unavoidable impacts to vernal pools, and vernal pool management. They emphasize the importance of linking vernal pool preserves, ensuring that preserves are large enough to protect vernal pool watersheds, and to ensure that no net loss of habitat area, value, and ecological function occur. In practice, the no net loss policy is applied to each individual project, thus ensuring that countywide development will meet the no net loss policy for wetlands and vernal pools. To achieve the goal of reserving and enhancing high-quality, self-sustaining vernal pool habitats in Sacramento County, various objectives and associated policies and implementation measures have been established.

County policies CO-60 through CO-77, as adopted in the General Plan, specifically provide protection and enhancement measures for marshes and riparian woodlands. Generally, the polices are designed to project marsh and riparian areas considered vital to migrating waterfowl and other sensitive species, maintain biological diversity, promote habitat restoration, invoke mitigation crediting where on-site mitigation is inappropriate, and implement riverbank stabilization compatible with riparian re-vegetation. The overall goal of the marsh and riparian habitat section of the Conservation Element is the attainment of healthy, well-managed marsh and riparian woodlands along Sacramento County waterways.

Urban and rural streams traverse much of Sacramento County. The subsection of the General Plan's Conservation Element addressing urban streams establishes the goal of preserving and protecting natural and open space values of urban stream corridors. Dry Creek, its associated habitat, and adjacent buffer areas, traverse diagonally across the northwestern corner of the long-term WA service area. Much of this corridor remains in a relatively natural state and is one of the last remaining undeveloped riparian corridors in the northern portion of Sacramento County. As such, it provides important habitat value to a variety of species (County of Sacramento Department of Regional Parks, Recreation and Open Space 2002). According to the County of Sacramento Department of Regional Parks (2002) the Dry Creek Parkway provides similar biological productivity and richness to the American River Parkway. The General Plan has established policies CO-103 through CO-127 to meet the goals of Sacramento County in preserving urban steams under potential urban development pressures.

The General Plan's Conservation Element subsection on tree resources includes polices CO-128 though CO-140 in support of Sacramento County's goal of preserving and protecting Sacramento trees. These policies, in conjunction with the Tree Preservation Ordinance (Sacramento County Code section 19.12; County of Sacramento 1981), sets the objectives of increasing regeneration of oak woodland, preservation of oaks (*Quercus* spp.) and other landmark trees (including the California black walnut (*Juglans californica* var. *hindsii*) and California sycamore (*Platanus racemosa*), but excluding cottonwood species (*Populus* spp.)), and increasing the number of urban native and non-native tree species within the "urban forest."

Lastly, the General Plan subsection on rare and endangered species acknowledges the increasing pressures imposed on rare and endangered species throughout Sacramento County. The objectives for the management of rare and endangered species' habitat include practices that are sensitive to the needs of the species and can be maintained in a manner that avoids conflicts with privately owned land and agricultural operations. These objectives are managed through adherence to County Policies CO-141 through CO-150 to meet the goal of increased populations of threatened and endangered species in Sacramento County.

In addition to the aforementioned policies, the County has proactively addressed specific issues regarding the protection and/or enhancement of sensitive species or their habitats through a variety of efforts external to the General Plan process. The following are examples of these efforts by Sacramento County:

- Passing of an ordinance providing for the establishment of Swainson's hawk (*Buteo swainsoni*) mitigation fees in the southern portion of the County (Deer Creek and Cosumnes river watersheds);
- Passing of an ordinance to pursue mitigation for wetland losses of less than one acre, which could occur under the Corps Nationwide Permit Program;
- Participation in the development and review of the Natomas Basin Habitat Conservation Plan (HCP) located in northwestern Sacramento County and southwestern Sutter County, which emphasizes the maintenance and enhancement of wetland and upland habitat through the establishment of a system of reserves. The primary habitat types targeted for preservation include freshwater marsh and grassland habitat for the giant garter snake (*Thamnophis gigas*) and Swainson's hawk, respectively;
- Development of the Dry Creek Parkway Recreation Master Plan and the associated environmental impact report.

The majority of the long-term WA service area (approximately 30.5 of 35.5 total square miles) lies within unincorporated Sacramento County.

McClellan Business Park

McClellan served as a military installation since 1936 and officially closed on July 13, 2001. Following closure of McClellan, land use authority was transferred to Sacramento County. The 2,856-acres from McClellan and approximately 634 acres along the Watt Avenue corridor are currently being redeveloped into McClellan Business Park. Development within McClellan Business Park must be in accordance with the Redevelopment Plan approved by Sacramento County on November 22, 2000. McClellan Park's master development plan consists of more than 16 million square feet of industrial, research and development, office, aviation, and mixed-use facilities.

Approximately 270 acres (0.4 square miles) along the western boundary of the McClellan/Watt Avenue Redevelopment Area lies within the City of Sacramento. The City adopted the Redevelopment Plan on October 31, 2000 and granted all of the redevelopment authorities to Sacramento County (SSWD Unpublished Work). Therefore, Sacramento County has land use authority for all development projects occurring within McClellan Business Park.

City of Citrus Heights

The City of Citrus Heights has land use authority for all development projects occurring within its jurisdiction. The Resource Conservation element of the Citrus Heights General Plan addresses biological resources, open space, energy conservation and cultural resources (City of Citrus Heights 2000). While Citrus Heights is about 95 percent developed, some of the City's largest vacant parcels adjoin sensitive natural areas. About one-quarter of the City's remaining vacant land is located within the Stock Ranch area, near the eastern boundary of the long-term WA service area.

The Citrus Heights General Plan recognizes the need to balance growth with the conservation and enhancement of the area's natural resources. The policies in the Resource Conservation section of the Citrus Heights General Plan are intended to enhance and preserve the City's existing natural resources, and provide for "no net loss" of sensitive habitats such as aquatic and riparian areas. The overall goals related to biological resources and open space (Goals 35 through 39) are to: 1) preserve, protect and enhance natural habitat areas, including creek and riparian corridors, oak woodlands, and wetlands; 2) protect special status species and other important species that are sensitive to human activities; 3) preserve, protect and increase plantings of trees within the City; 4) establish a system of creekside trails and parks for public use; and 5) create open spaces in future urban development with natural features for public use and enjoyment.

Approximately 3,194 acres (5 square miles) of the long-term WA service area lie within the City of Citrus Heights.

Dry Creek Coordinated Resource Management Plan

During 1995, several developments catalyzed the merger of the Dry Creek Parkway Citizens Advisory Committee with the Friends of the Roseville Parkway into the Dry Creek Conservancy. Shortly thereafter, the Dry Creek Conservancy established the Dry Creek Coordinated Management and Planning Group (now called the Dry Creek Watershed Council), and developed the MOU Regarding the Development of Dry Creek Coordinated Resource Management Planning Initiative. From this initiative came the Dry Creek Coordinated Resource Management Plan (Dry Creek CRMP), which compiles available data on watershed resources and the opinions/objectives of a wide variety of stakeholders. The Dry Creek CRMP is intended to identify management goals and implementation strategies, and through the use of adaptive management, should remain applicable to future planning and implementation efforts. The goals for this planning effort include: (1) to balance the changes resulting from past, present, and anticipated economic development activities with the Dry Creek CRMP's Working Group interest in establishing a sustainable, natural, and healthy aquatic and terrestrial environment within the Dry Creek watershed; and (2) to achieve the balance described in Goal 1 within the Dry Creek watershed after an acceptable baseline environmental

condition has been identified by the plan and satisfactorily achieved by the plan's implementation.

3.5.2 French Meadows and Hell Hole Reservoirs

Higher elevations along the Middle Fork American River, such as those of French Meadows and Hell Hole reservoirs, display montane woodlands and forests (mixed conifer (*Pinus* spp. and *Pseudotsuga menziesii*), oak (*Quercus* spp.), and montane hardwoods). These reservoirs also provide lacustrine[7] habitat for terrestrial species. Developed areas exist at the dams, public boat launches, and campgrounds on these reservoirs. Fluctuations in reservoir water surface elevations create a barren band around the reservoirs (i.e., the reservoir drawdown zone). These zones are essentially devoid of vegetation and therefore, do not provide valuable plant communities or animal habitats.

3.5.3 Middle Fork and North Fork American Rivers

The Middle Fork American River and lower North Fork American River flow through a variety of habitats as they pass from Ralston Afterbay to Folsom Lake. Habitats associated with this area include montane woodland and forests (mixed conifer and oak), montane riparian, upland scrub (whiteleaf manzanita (*Arctostaphylos viscida*), urban-agriculture, montane riverine aquatic, and non-tidal freshwater permanent emergent wetlands. Montane woodlands and forests are predominantly ponderosa pine (*Pinus ponderosa*) forests.

At least 238 species of birds, 47 mammals, 10 amphibians, and 20 species of reptiles are supported by the American River Canyon ecosystem and its habitats. Potential habitat for approximately 90 species of neotropical migratory birds includes habitat for the black-chinned hummingbird (*Archilochus alexandri*), calliope hummingbird (*Stellula calliope*), belted kingfisher (*Ceryle alcyon*), yellow-breasted chat (*Icteria virens*), yellow warbler (*Dendroica petechia*), Wilson's warbler (*Wilsonia pusilla*), common yellowthroat (*Geothlypis trichas*), Macgillivray's warbler (*Opornis tolmiei*), and Lincoln's sparrow (*Melospiza lincolnii*).

3.5.4 Folsom Reservoir and Lake Natoma

Habitats associated with Folsom Reservoir include non-native grassland, blue oak-pine woodland, and mixed oak woodland. Non-native grasslands occur around the reservoir, primarily at the southern end. The majority of the drawdown zone is devoid of vegetation, although arroyo willow (*Salix lasiolepis*) and narrow-leaved willow (*Salix exigua*) have established in some areas (USFWS 1991). The only contiguous riparian vegetation occurs along Sweetwater Creek at the southern end of the reservoir (USFWS 1991). Because the drawdown zone is virtually devoid of vegetation and the sparse willows that have established in some areas do not form a contiguous riparian community, the drawdown zone does not possess substantial habitat value.

Non-native grassland habitat around the reservoir consists of wild oats (*Avena fatua*), soft chess brome (*Bromus hordeaceus*), ryegrass (*Lolium multiflorum*), mustard (*Brassica* sp.), and foxtail (*Hordeum murinum* ssp. *leporinum*). The oak woodland habitat located on the upland banks and slopes of the reservoir is dominated by live oak (*Quercus wislizeni*), blue oak (*Quercus douglasii*), and foothill pine (*Pinus sabiniana*) with several species of understory shrubs and forbs including

[7] Lacustrine is defined as: of, relating to, formed in, living in, or growing in lakes.

poison oak (*Toxicodendron diversilobum*), manzanita (*Arctostaphylos* sp.), California wild rose (*Rosa californica*), and lupine (*Lupinus* spp.).

Oak-pine woodlands and non-native grasslands in the reservoir area support a variety of birds, including acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), western wood pewee (*Contopus sordidulus*), scrub jay (*Aphelocoma californica*), Bewick's wren (*Thryomanes bewickii*), plain titmouse (*Parus inornatus*), hermit thrush (*Catharus guttatus*), loggerhead shrike (*Lanius ludovicianus*), black-headed grosbeak (*Pheucticus melanocephalus*), dark-eyed junco (*Junco hyemalis*), and Bullock's oriole (*Icterus bullockii*). A number of raptor species also utilize oak woodland habitats for nesting, foraging, and roosting including red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), great horned owl (*Bubo virginianus*), and long-eared owl (*Asio otus*). Mammal species likely to occur in the woodland habitat include mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis)*, black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyi*), and a variety of rodents. Amphibians and reptiles that may be found in oak woodlands include California newt (*Taricha torosa*), Pacific tree frog (*Hyla regilla*), western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis catenifer*), common kingsnake (*Lampropeltis getulus*), and western rattlesnake (*Crotalus viridis*).

The non-native grassland surrounding Folsom Reservoir represents habitat for a variety of rodents, which in turn serve as a prey base for carnivores such as hawks and owls, coyote, bobcat, gray fox, and some snakes. Although very few birds nest in the grassland areas, a number of species forage in this habitat, including white-crowned sparrow (*Zonotrichia leucophrys*), lesser goldfinch (*Carduelis psaltria*), western meadowlark (*Sturnella neglecta*), and several raptor species. Migratory waterfowl are known to feed and rest in the grasslands associated with the North Fork American River above Folsom Reservoir (USFWS 1991). Several of the reptiles and amphibians that inhabit the oak woodlands also occur in the adjacent non-native grasslands.

The primary vegetation around Lake Natoma consists of cottonwoods, poison oak, and wild grape (*Vitis californica*). Vegetation surrounding the lake is subject to variable water levels that fluctuate several feet in elevation daily and weekly. Wildlife communities found at Lake Natoma are similar to those found at Folsom Reservoir.

3.5.5 Lower American River

The lower American River provides a diverse assemblage of vegetation communities, including freshwater marsh and emergent wetland, riparian scrub, riparian forest, and in the upper, drier areas farther away from the river, oak woodland and non-native grassland. The current distribution and structure of riparian communities along the river has been determined by human-induced changes such as gravel extraction, dam construction and operation, levee construction and maintenance, and historic and on-going streamflow and sedimentation processes. Because of these factors, several riparian vegetation zones exist along the banks of the lower American River.

In general, willow scrub and alder forest tend to occupy areas within the active channel of the lower American River, which are repeatedly disturbed by river flows. Cottonwood-willow

thickets and cottonwood forests occupy the narrow belts along the active river channel where repeated disturbance by occasional high flows keep the vegetative communities at earlier successional stages. Fremont cottonwood (*Populus fremontii*) dominates these riparian forest zones. Other species associated with this habitat include various willow species (*Salix* spp.), poison oak, wild grape, blackberry (*Rubus ursinus*), northern California black walnut (*Juglans californica* var. *hindsii*), and white alder (*Alnus rhombifolia*).

Alder-cottonwood forest is typical of the steep, but moist banks along much of the river corridor. Valley oak woodland occurs on upper terraces composed of fine sediment where soil moisture provides a long growing season. Valley oak (*Quercus lobata*) is the dominant tree species in these areas, although some of the sites also have a cottonwood component as a result of infrequent flood inundation. Live oak woodland occurs in the more arid and gravelly terraces that are isolated from the fluvial dynamics and moisture of the river. Non-native grassland commonly occurs in areas that have been disturbed by human activity and can be found on many of the sites within the river corridor.

Backwater areas and off-river ponds that are recharged during high flows support emergent wetland vegetation. These habitat areas are located throughout the length of the river, but occur more regularly downstream of the Watt Avenue bridge. Plant species that dominate this habitat type include various species of willow, sedge (*Carex* spp.), cattail (*Typha* spp.), bulrush (*Scirpus* spp.), rush (*Juncus* spp.), barnyard grass (*Echinochloa crusgalli*), slough grass (*Paspalum dilatatum*), and lycopus (*Lycopus americanus*).

Previous studies have determined that the cottonwood-dominated riparian forest and areas associated with the backwater and off-river ponds are highest in wildlife diversity and species richness relative to other river corridor habitats (Sanders *et al.* 1985; USFWS 1991). More than 220 species of birds have been recorded along the lower American River and more than 60 species are known to nest in the riparian habitats (USFWS 1991). Common species that can be found along the river include great blue heron (*Ardea herodias*), mallard (*Anas platyrhynchos*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), California quail (*Callipepla californica*), killdeer (*Charadrius vociferous*), belted kingfisher (*Ceryle alcyon*), western scrub jay (*Aphelocoma californica*), ash-throated flycatcher (*Myiarchus cinerascens*), tree swallow (*Tachycineta bicolor*), and American robin (*Turdus migratorius*).

Additionally, more than 30 species of mammals reside along the river, including striped skunk, Virginia opossum, brush rabbit (*Sylvilagus bachmani*), raccoon, western gray squirrel (*Sciurus griseus*), California ground squirrel, meadow vole (*Microtus pennsylvanicus*), muskrat (*Ondatra zibethicus*), black-tailed deer (*Odocoileus hemionus*), gray fox, and coyote.

The most common reptiles and amphibians that depend on the riparian habitats along the river include western toad (*Bufo boreas*), Pacific tree frog, bullfrog (*Rana catesbeiana*), western pond turtle (*Clemmys marmorata*), western fence lizard, common garter snake (*Thamnophis sirtalis*), and gopher snake.

Wildlife species that have been recorded in backwater pond areas include: pied-billed grebe (*Podilymbus podiceps*), American bittern (*Botaurus lentiginosus*), green heron (*Butorides striatus*), common merganser (*Mergus merganser*), white-tailed kite (*Elanus leucurus*), wood duck (*Aix*

sponsa), yellow warbler (*Dendroica petechia*), warbling vireo (*Vireo gilvus*), dusky-footed woodrat (*Neotoma fuscipes*), western gray squirrel, Pacific tree frog, and western toad.

3.5.6 Long-Term Warren Act Service Area

Although much of the natural vegetation of the long-term WA service area has been reduced in extent or disturbed by human activities (see Section 4.5.2, Long-Term Warren Act Service Area Impacts, for further discussion), several different habitat types can be found throughout the area. Section 3.3.7 discusses the aquatic habitats for the primary drainages occurring within the long-term WA service area. In addition, riparian and terrestrial habitats within the long-term WA service area include seasonal wetlands (consisting of vernal pools and swales), grasslands, blue oak woodland, and urban, agricultural, and rangeland.

Grasslands

Grasslands within the long-term WA service area are generally interspersed with agricultural and urban areas. They are primarily comprised of non-native species with a large number of annual grasses and forbs. Dominant grass species include wild oat, soft chess brome, ripgut brome (*Bromus rigidis*), wild barley (*Hordeum murinum*), and foxtail fescue (*Festuca megalura*). Typical forbs include filaree (*Erodium* spp.), turkey mullein (*Eremocarpus setigerus*), and clover (*Trifolium* spp.). Grassland habitat provides forage area for raptors such as red-tailed hawk roosting in adjacent forested areas and soaring species such as turkey vulture (*Cathartes aura*). Ring-necked pheasant (*Phasianus colchicus*), California quail (*Callipepla californica*), and numerous passerine birds are common. Grassland reptiles include the western fence lizard, common garter snake, and western rattlesnake. Grasslands also provide important habitat for black-tailed deer, coyote, striped skunk, and gray fox.

Blue Oak Woodland

Blue oak woodland occurs in valley uplands and foothill areas. It is generally considered a climax woodland community characterized by blue oak *(Quercus douglasii)* and gray pine *(Pinus sabiniana).* Other oak species also are found in this community, but are typically less common than blue oak. Stands may form a fairly dense canopy with a shrubby understory or exist in open grassy savannas. Oak woodlands generally provide important nesting and foraging habitat for a variety of bird species, including raptors as well as numerous mammal and reptile species.

Urban, Agricultural, and Rangeland

Urban, agricultural, and rangeland habitat types are disturbed areas supporting relatively low-diversity and low-density plant and animal communities. Urban vegetation varies according to location and includes native and non-native shade trees, lawns, shrubs, and landscaping strips. Urban vegetation is common throughout developed areas within the long-term WA service area. Urban wildlife includes a variety of resident and non-resident songbirds as well as several species of small mammals including squirrels, rodents, and raccoons. Agricultural areas and rangeland can be found at the outer edges of the long-term WA service area, particularly along the adjacent Rio Linda and Elverta areas. Giant garter snakes could potentially be found within agricultural waterways including irrigation ditches and canals, as well as in rice fields. Raptors including Swainson's hawks and red-tailed hawks utilize agricultural and rangeland areas as foraging habitat.

Riparian Habitats

Riparian communities occur along waterways and provide foraging habitat, escape cover, and nesting/denning areas for a variety of wildlife species. The composition and structure of vegetation within this habitat type generally is diverse, which results in the potential for a diverse wildlife community including various migrant and resident passerine bird species, raptors, waterfowl, small mammals such as ringtail (*Bassariscus astutus*), skunk, and long-tailed weasel (*Mustela frenata*), and larger mammals including gray fox, black-tailed deer, and coyote. Riparian areas also provide important corridors for wildlife movement and migration.

Wetlands and Vernal Pools

The backwaters and eddies of old oxbow lakes and river channels near the current American River channel form a system of near shore emergent wetlands. In shallow areas, emergent vegetation such as cattail and bulrush are common. In the moist upper reaches, horsetail (*Equisetum laevigatum*) commonly is found. Willows often are abundant and the surrounding canopy consists of riparian forest species. Wildlife typically found in these wetland areas includes various shorebird species, great blue heron (*Ardea herodius*), great egret (*Ardea alba*), and a variety of waterfowl. Giant garter snake also could potentially inhabit wetland areas.

Vernal pools are depressions in the terrain with a unique semi-impermeable soil structure, which allows them to collect water during seasonal rainy periods and drain slowly throughout the spring and early summer months. Several rare plants grow within vernal pools including Sacramento Orcutt grass (*Orcuttia viscida*), dwarf dowingia (*Downingia pusilla*), and legenere (*Legenere limosa*). Terrestrial wildlife such as waterfowl, wading birds, and two federally listed invertebrate species, vernal pool fairy shrimp (*Branchinecta lynchi*) and vernal pool tadpole shrimp (*Lepiduras packardi*), also utilize vernal pools.

3.5.7 Species Occurrence within the Action Area

Several information sources were used to identify special-status terrestrial and riparian species occurring or potentially occurring within the action area, including species that were identified through USFWS species lists and CDFG CNDDB queries. The federally and state listed, proposed listed, and candidate species under the federal or state endangered species acts that occur, or have the potential to occur, within riparian and terrestrial habitats within the action area are listed in **Table 3-2**. Appendix B contains NMFS correspondence and USFWS and CNDDB lists of special-status species that occur, or have the potential to occur, within the action area, including federal and state species of concern.

Those federally and state listed, proposed listed, and candidate species that occur, or have the potential to occur, within the action area that could be affected by implementation of the Proposed Action, are discussed below. State listed species in which potential impacts have been fully analyzed within the Groundwater Stabilization Project EIR and those species that would not be affected by the Proposed Action are not discussed further.

Table 3-2. Federally and state listed, proposed listed, and candidate terrestrial and riparian species potentially occurring within the action area.

Species	Common Name	Status Federal[1]/ State[2]/ CNPS[3]	Habitat Requirements	Location (USGS Quadrangle)	Potential for Project-Related Affects
Invertebrates					
Branchinecta lynchi	Vernal pool fairy shrimp	T/--/--	Vernal pools	Carmichael, Citrus Heights, Clarksville, Folsom, Rio Linda, Rocklin, Sac East, Sac West	May occur due to confirmed presence of vernal pools within the long-term WA service area
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T/--/--	Elderberry shrubs. Typically found in riparian elderberry shrubs	Auburn, Carmichael, Citrus Heights, Clarksville, Folsom, Foresthill, Georgetown, Greenwood, Pilot Hill, Rio Linda, Rocklin, Sac East, Sac West, Tunnel Hill	May occur due to potential presence within the long-term WA service area
Lepiduras packardi	Vernal pool tadpole shrimp	E/--/--	Vernal pools	Carmichael, Citrus Heights, Folsom, Rio Linda, Rocklin, Sac East, Sac West	May occur due to confirmed presence of vernal pools within the long-term WA service area
Amphibians					
Ambystoma californiense	California tiger salamander[4]	T/CSC/--	Vernal pools for breeding; small mammal burrows or holes in annual grassland and oak woodland areas	Carmichael, Citrus Heights, Clarksville, Folsom, Rio Linda, Sac East, Sac West	Not likely to occur due to lack of habitat associated with reservoir storage and rivers; and intense urbanization within the long-term WA service area; and lack of known extant populations in the American River watershed
Rana aurora draytonii	California red-legged frog	T/CSC/--	Permanent and semi-permanent quiet aquatic environments with emergent, submergent, and riparian vegetation. Currently occupies coastal drainages in Central CA and scattered streams in the Sierra Nevada	Auburn, Carmichael, Citrus Heights, Clarksville, Folsom, Foresthill, Georgetown, Greenwood, Michigan Bluff, Pilot Hill, Rio Linda, Rocklin, Tunnel Hill, Sac East, Sac West	Not likely to occur due to lack of habitat associated with reservoir storage and rivers; intense urbanization within the long-term WA service area; known predators associated with Dry Creek, and lack of known extant populations in the Central Valley lowlands
Rana muscosa	Mountain yellow-legged frog	C/CSC/--	Streams, lakes and ponds in montane riparian, lodgepole pine, subalpine conifer, and wet meadow habitat types at elevations above 5,940 ft in the Sierra Nevada	Bunker Hill, Royal Gorge, Wentworth Springs	Not likely to occur due to lack of habitat within the action area

Table 3-2. Federally and state listed, proposed listed, and candidate terrestrial and riparian species potentially occurring within the action area.

Species	Common Name	Status Federal[1]/ State[2]/ CNPS[3]	Habitat Requirements	Location (USGS Quadrangle)	Potential for Project-Related Affects
Mammals					
Martes pennanti	Fisher	C/CSC/--	Intermediate to large-tree stages of coniferous forests and deciduous-riparian habitats with a high percent canopy closure	Bunker Hill, Foresthill, Royal Gorge, Tunnel Hill, Wentworth Springs	Not likely to occur due to lack of habitat associated with reservoir storage and rivers
Gulo gulo	California wolverine	--/ST/--	In the northern Sierra Nevada: mixed conifer, red fir, and lodgepole pine habitats from 4,300 to 7,300 feet. In the southern Sierra Nevada: red fir, mixed conifer, lodgepole pine, subalpine conifer, alpine dwarf-shrub, and barren habitats from 6,400 to 10,800 feet	Royal Gorge	Not likely to occur due to lack of habitat associated with reservoir storage and rivers
Vulpes vulpes necator	Sierra Nevada Red Fox	--/ST/--	Red fir and lodgepole pine forests in the subalpine zone and alpine fell-fields of the Sierra Nevada. The fox may hunt in forest openings, meadows, and barren rocky areas associated with its high elevation habitats	Bunker Hill, Royal Gorge, Wentworth Springs	Not likely to occur due to lack of habitat associated with reservoir storage and rivers
Reptiles					
Thamnophis gigas	Giant garter snake	T/ST/--	Sloughs, irrigation ditches, and channels for foraging, grassy banks, and emergent vegetation for basking	Carmichael, Citrus Heights, Clarksville, Folsom, Rio Linda, Rocklin, Sac East, Sac West	Not likely to occur due to lack of habitat associated with reservoir storage and rivers; intense urbanization within the long-term WA service area; and lack of habitat and presence of predatory game fish in Dry Creek

Table 3-2. Federally and state listed, proposed listed, and candidate terrestrial and riparian species potentially occurring within the action area.

Species	Common Name	Status Federal[1]/ State[2]/ CNPS[3]	Habitat Requirements	Location (USGS Quadrangle)	Potential for Project-Related Affects
Birds					
Buteo Swainsoni	Swainson's hawk	SC/ST/--	Nests primarily in riparian habitats, forages over open grasslands and agricultural fields	Carmichael, Citrus Heights, Clarksville, Folsom, Pilot Hill, Rio Linda, Rocklin, Sac East, Sac West	May occur due to potential presence within the long-term WA service area (effects already addressed in Groundwater Stabilization Project EIR); not likely to occur within remainder of action area due to lack of habitat associated with storage reservoirs and rivers
Haliaeetus leucocephalus	Bald eagle	FPD/T /SE/--	Nests and roosts in coniferous forests near lakes, reservoirs, and rivers	Auburn, Bunker Hill, Carmichael, Citrus Heights, Clarksville, Folsom, Foresthill, Georgetown, Greenwood, Michigan Bluff, Pilot Hill, Rio Linda, Rocklin, Sac East, Sac West, Tunnel Hill	May occur due to potential presence associated with storage reservoirs within the American River basin
Riparia riparia	Bank swallow	SC/ST/--	Requires nearly vertical, sandy riverbanks for creating nest burrows	Auburn, Carmichael, Citrus Heights, Clarksville, Folsom, Foresthill, Greenwood, Pilot Hill, Rocklin, Sac East, Sac West, Rio Linda	May occur due to potential presence associated with Middle Fork and lower American rivers (effects associated with lower American River already addressed in Groundwater Stabilization Project EIR); not likely to occur within long-term WA service area due to lack of habitat
Empidonax traillii brewsteri	Little willow flycatcher	SC/SE/--	Montane wetland shrub habitat consisting of Sierra Nevada wet meadows, with a shrub component dominated by willows (or other riparian deciduous shrubs)	Auburn, Carmichael, Citrus Heights, Clarksville, Folsom, Foresthill, Georgetown, Greenwood, Pilot Hill, Rio Linda, Rocklin, Sac East, Sac West, Tunnel Hill	Not likely to occur due to lack of known extant populations in the Sacramento Valley; intense urbanization within the long-term WA service area; and lack of habitat associated with storage reservoirs and rivers
Grus canadensis tabida	Greater sandhill crane	SC/ST/--	Migratory; winters in Central Valley; often feeds and rests in fields and agricultural lands; roosts at night along river channels, on alluvial islands of braided rivers, or natural basin wetlands	Carmichael, Citrus Heights, Rio Linda, Sac East, Sac West	Not likely to occur due to lack of habitat associated with storage reservoirs and rivers; and intense urbanization within the long-term WA service area

Table 3-2. Federally and state listed, proposed listed, and candidate terrestrial and riparian species potentially occurring within the action area.

Species	Common Name	Status Federal[1]/ State[2]/ CNPS[3]	Habitat Requirements	Location (USGS Quadrangle)	Potential for Project-Related Affects
Plants					
Gratiola heterosepala	Boggs Lake hedge-hyssop	SC/SE/1B	Vernal pools, lake margins	Carmichael, Rio Linda, Rocklin	May occur due to confirmed presence of vernal pools within the long-term WA service area (effects already addressed in Groundwater Stabilization EIR); not likely to occur within remainder of action area due to lack of habitat associated with storage reservoirs and rivers
Calystegia stebbinsii	Stebbin's morning-glory	E/SE/1B	Mixed chaparral communities on gabbro-derived and serpentine-derived soils in El Dorado and Nevada counties	Pilot Hill	Not likely to occur due to lack of habitat within the action area
Ceanothus roderickii	Pine Hill ceanothus	E/Rare/1B	Gabbroic soil in chaparral and oak woodland	Clarksville, Pilot Hill	Not likely to occur due to lack of habitat within the action area
Fremontodendron californicum ssp. decumbens	Pine Hill flannelbush	E/Rare/1B	Chaparral and oak woodland, most commonly in gabbroic soil	Clarksville	Not likely to occur due to lack of habitat within the action area
Galium californicum ssp. sierrae	El Dorado bedstraw	E/Rare/1B	Gabbroic soil in chaparral and oak woodland	Clarksville, Pilot Hill	Not likely to occur due to lack of habitat within the action area
Senecio layneae	Layne's butterweed (=ragwort)	T/Rare/1B	Gabbroic soil in chaparral and oak woodland	Clarksville, Georgetown, Pilot Hill	Not likely to occur due to lack of habitat within the action area
Orcuttia viscida	Sacramento Orcutt grass	E/SE/1B	Vernal pools	Folsom	Not likely to occur due to lack of habitat associated with reservoir storage and rivers; and not identified within the long-term WA service area or vicinity

1 Federal Status: E=Endangered; T=Threatened; P=Proposed Endangered or Threatened; C=Candidate; FPD/T=Federally proposed for De-listing as Threatened; DM=De-listed (monitored first 5 years); SC=Species of Concern

2 State Status: SE=Endangered; ST=Threatened; CSC=Species of Special Concern; FP=Fully Protected against take pursuant to Fish and Game Code Section 3503.5

3 CNPS: 1B=Rare, threatened, or endangered in California or elsewhere

4 California tiger salamander was designated as Proposed Threatened in Central CA on May 23, 2003, and was listed statewide as "threatened" on November 24, 2004.

Source: CDFG CNDDB, USFWS species list, and NMFS correspondence (see Appendix B)

Vernal Pool Fairy Shrimp (Branchinecta lynchi)

Vernal pool fairy shrimp have a relatively wide geographic range. The species is endemic to the vernal pools of the Central Valley, coast ranges, and a limited number of sites in the Transverse Range and Santa Rosa Plateau. The majority of known populations inhabit vernal pools with clear to tea-colored water, and are typically found in grass- or mud-bottomed swales, or basalt flow depression pools in unplowed grasslands. The species generally occurs at low densities and exhibits a sporadic distribution within vernal pool complexes with the majority of pools in a given complex being uninhabited by this species (59 FR 48136).

The CNDDB indicates that there is one occurrence of vernal pool habitat within the long-term WA service area, which is located on the west side of McClellan. According to Dr. Holland's wetland identification and mapping for use by USFWS in recovery planning for listed and sensitive species (USFWS *et al.* 1998), additional vernal pools may be located to the north and south of McClellan, as well as to the east of Dry Creek within the northwestern corner of the long-term WA service area. The vernal pool habitat potentially capable of supporting vernal pool fairy shrimp has declined dramatically due to urban, highway, flood control, water supply, and utility projects, as well as conversion of wildlands to agriculture. Vernal pool fairy shrimp also have been impacted by changes in hydrologic patterns, overgrazing, and off-road vehicle use (59 FR 48136). Potential impacts on this species could be associated with land conversion and construction activities.

Vernal Pool Tadpole Shrimp (Lepiduras packardi)

Vernal pool tadpole shrimp are endemic to the vernal pools of the Central Valley, Coast Ranges, and a limited number of sites in the Transverse Range and Santa Rosa Plateau. Suitable pools typically are found in grass-bottomed swales of grasslands in old alluvial soils underlain by hardpan, or in mud-bottomed pools containing highly turbid water. The species tends to be sporadic in its distribution, often inhabiting only a single pool within a vernal pool complex (59 FR 48136).

The CNDDB indicates that there is one occurrence of vernal pool habitat within the long-term WA service area. According to Dr. Holland's wetland identification and mapping, several additional vernal pools may be located within the long-term WA service area (see discussion above related to vernal pool fairy shrimp). Vernal pools within these areas may provide suitable habitat for vernal pool tadpole shrimp.

Vernal pool habitat that could potentially support this species has declined dramatically due to urban, highway, flood control, water, and utility projects, as well as conversion of wildlands to agriculture. Vernal pool tadpole shrimp also have been impacted by changes in hydrologic patterns, overgrazing, and off-road vehicle use (59 FR 48136). Potential impacts on this species could be associated with land conversion and construction activities.

Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)

Valley Elderberry Longhorn Beetles (VELBs) are entirely dependent on elderberry shrubs (*Sambucus* spp.) for both reproduction and a food source. Elderberry shrubs that support VELBs are most commonly found in riparian habitat. Adult beetles feed and lay eggs on elderberry shrubs, where the larvae remain within the elderberry stems until they emerge as

adults through newly formed exit holes. USFWS has designated the American River Parkway as critical habitat for this beetle (USFWS 1996a). Potential impacts to this species typically are associated with land conversion and construction activities where elderberry shrubs are removed or impacted. Changes in hydrology affecting elderberry shrubs also could jeopardize VELBs.

Bald Eagle (Haliaeetus leucocephalus)

Bald eagles typically are found near open water (e.g., reservoirs, lakes, and rivers) and often use these habitats to forage on resident and anadromous fish species. Such areas require an adequate food base, perching areas, and nesting sites to support bald eagles. Large, dead trees near open water typically are used for perching and are an important habitat component. During winter bald eagles often congregate at specific wintering sites that generally are close to open water and that offer good perch trees and night roosts. Bald eagles have been observed at and around Folsom Reservoir during the winter season, although generally in low numbers. Fish are the primary prey type, although bald eagles also take small mammals, birds, and carrion.

Bank Swallow (Riparia riparia)

Bank swallows prefer nesting colony sites in natural banks, bluffs, and cliffs where erosion, primarily from running water, maintains a vertical surface. The vertical surface discourages growth of vegetation and protects nest sites from predation. Soils must be of sand or loam to allow for burrowing (Garrison and McKernan 1994).

Two bank swallow colonies have been recorded along the lower American River. Potential effects on bank swallows within the lower American River have already been addressed within the Groundwater Stabilization EIR (PCWA and NWD 1999). However, USFWS/CNDDB data indicates bank swallows also could occur along the Middle Fork American River. Alteration of the flow of water affecting the natural erosion of the banks used as nesting colony sites may adversely impact this species. Bank stabilization or grading may eliminate nesting habitat.

3.6 CULTURAL RESOURCES

This section identifies the prehistoric and historic cultural sites that could be affected by the Proposed Action, including a summary of the historic and prehistoric sites recorded within the American River watershed and the long-term WA service area. Much of these data have been established through anthropological, archaeological, and historic studies conducted over the past several decades.

3.6.1 Regulatory Setting

Preserving the nation's past is a goal of legislation that includes the Historic Sites Act of 1935, Antiquities Act of 1906, the National Historic Preservation Act (NHPA) of 1966, and Archeological Resource Protection Act of 1979. NHPA, Section 106, regulations (36 CFR 800) require that federal agencies to identify, evaluate, assess impacts to historic properties (cultural resources determined eligible for inclusion in the National Register of Historic Places [NRHP]), and mitigate adverse impacts to historic properties. The State Historic Preservation Officer, the Advisory Council on Historic Preservation, Indian Tribes, and other individuals and organizations can participate in the Section 106 process.

Similar state regulations protect archeological and historical sites, and specifically provide for identification and protection of traditional Native American gathering and ceremonial sites on state land. These regulations include CEQA and various provisions within Public Resources Code Division 5 (Parks and Monuments).

3.6.2 French Meadows and Hell Hole Reservoirs

The area within Hell Hole Reservoir has not been surveyed extensively; four surveys covered some of the area within ½ mile of the reservoir. One prehistoric site was recorded to be within ½ mile of the reservoir. Three studies constitute the body of literature that applies directly to Hell Hole Reservoir (Goddard 1985; Lasick 1997; Peterson 1993).

Surveys for cultural and historic resources exist for approximately 99 percent of French Meadows Reservoir and identify only a few sites within ½ mile of the project area. 1953 topographic maps reveal that there may be some unrecorded historic resources that are now under water. One archeological study identified a small "campsite" at the upper end of the reservoir (Shapiro and Jackson 1994). Six studies comprise the breadth of information gathered on cultural resources around French Meadows Reservoir (Baldrica 1989; Brooke 1999; DeMasi 1981; Miller 1990; Smith 1994; Smith 1978).

3.6.3 Middle Fork and North Fork American Rivers

The southern Maidu or Nisenan bands inhabited the upper and lower reaches of the American River watershed and practiced relatively the same cultural traditions and basketry production as their northern tribal family. Prehistoric sites on the upper reaches of the American River include midden deposits (loose, dark soil with organic debris containing burned food, charcoal, bone, and rock), lithic scatters, petroglyphs, settlements with house pits, rock shelters, and bedrock mortars. These sites were large and small villages, cemeteries, resource procurement and processing areas, quarries, ceremonial sites, workshops, and temporary campsites. Prehistoric archeological sites exist throughout the region, except on extremely rugged terrain and in areas without water. Most prehistoric sites of cultural interest in the area are found on gentle to moderately sloping sites within 500 feet of surface water sources (Placer County 1994).

3.6.4 Folsom Reservoir and Lake Natoma

A total of 157 archaeological sites have been recorded within or immediately adjacent to Folsom Reservoir. Of these, 34 sites are historic, 110 are prehistoric, and 13 have both historic and prehistoric components. Prehistoric site types and features include midden deposits, possible burials, chipped stone scatters, ground stone, milling stations, and artifact scatters. Historic site types and features include towns, foundations and structures, debris scatters and dumps, mining tunnels, rock walls, bridges, ditches, flumes and water pipes, and cemeteries and individual burial sites (Corps 1996b).

In addition to the recorded archaeological sites, four isolated artifacts have been recorded within Folsom Reservoir, one known prehistoric archaeological site was inundated before it could be recorded, and numerous historic sites and features have not been recorded (Peak & Associates 1990).

Prior to construction of Folsom Dam in 1955, only one archaeological survey of the reservoir basin had been completed (Fenenga 1948). One prehistoric site was documented within the

planned reservoir pool. The results of this survey likely are a reflection of methodology considered appropriate during the time period in which the surveys were conducted, than of the actual prehistoric and historic settlement patterns now known to have occurred in the region. Since that survey, periodic investigations in the Folsom State Recreational Area have resulted in the generation of site records and survey reports describing nearly 170 archaeological sites within the area. The level of detail and accuracy of these reports varies widely (SAFCA and Reclamation 1994).

The Folsom Powerhouse was listed as a National Historic Landmark in 1973. In addition, a ditch runs within the drawdown zone of Folsom Lake that has been determined eligible for inclusion in the National Register. No other archaeological sites within Folsom Reservoir have been declared eligible or are listed in the NRHP (SAFCA and Reclamation 1994).

Many studies have been carried out in and adjacent to the Folsom Reservoir basin. One hundred and twenty-three (123) prehistoric sites or components have been recorded, some with remnant patches of midden. Human burials are noted on a few of the early (1940s-50s) site records, but the present status of these burial sites is unknown. Forty-seven historic-period sites have been recorded at Folsom Reservoir, mostly related to mining, transportation, and settlement. Many of the recorded sites show signs of adverse effects from wave action, inundation, and/or recreation use at the reservoir (Corps 1996a).

Lake Natoma lies within the boundaries of the Folsom historic gold mining district. At least three known prehistoric sites were inundated by Lake Natoma (Corps 1996a).

3.6.5 Lower American River

Fifty-two archaeological sites have been recorded in the lower American River. Of these 52 sites, 7 are historic, 44 are prehistoric, and 1 has prehistoric and historic components. Seven of the prehistoric sites have been destroyed or severely damaged. Prehistoric site types and features include village mounds and midden deposits, burials, artifact scatters, milling stations, and chipped and ground stone scatters. Historic site types and features include a cemetery, bridge abutments, a hydroelectric power system, mining tailings, and water pipes (Corps 1996a).

3.6.6 Long-Term Warren Act Service Area

Although no previously recorded prehistoric sites have been identified within the long-term WA service area, historic archeological resources do exist, along with an unrecorded section of the First Transcontinental Railroad alignment (which now exists as the main Union Pacific line from Sacramento to Roseville). The railroad segment is a very old and historic alignment and additional recordings are expected as future archeological surveys are conducted in the alignment area (Russo 1998 *in* (PCWA and NWD 1998)).

Within Sacramento County, there is one listed historic property located within the long-term WA service area. In North Highlands, located at McClellan, the Sacramento Air Depot Historic District was listed in the NRHP on January 21, 1992 (NPS Website 2005). According to the listing of California Historical Landmarks and California Points of Historical interest, no properties or structures contained on either list exist within the long-term WA service area.

There are a large number of recorded buildings and structures listed in the Directory of Properties in the Historic Property Data File for Sacramento County. Within the long-term WA service area and the surrounding vicinity, the directory lists six properties in Citrus Heights, two in North Highlands, and 117 at McClellan (Russo 1998 *in* (PCWA and NWD 1998)).

3.7 RECREATION

Recreational resources associated with French Meadows, Hell Hole, and Folsom reservoirs, the Middle Fork, North Fork, and lower American rivers, and within the long-term WA service area would be affected by implementation of the Proposed Action. This section provides a description of the recreational opportunities and facilities associated with these water bodies and the project service area.

3.7.1 Regulatory Setting

There are no regulatory agencies relevant to the recreational opportunities or facilities discussed in this section.

3.7.2 French Meadows and Hell Hole Reservoirs

French Meadows Reservoir, which is on the Middle Fork American River, provides recreational opportunities for camping, boating, picnicking, horseback riding, and hiking. The reservoir provides boat access via two launch sites. The boat ramps become unavailable to trailers when the storage drops below 58,700 AF (5,206 feet msl) (PCWA 2001). Fishing for rainbow and brown trout is also a popular recreational activity.

Hell Hole Reservoir is in the El Dorado National Forest on the Rubicon River, a tributary to the Middle Fork American River. The primary recreational activities on this reservoir are camping and fishing. One boat launch site suitable for small craft is accessible when storage in the reservoir is above 106,150 AF (4,540 feet above msl) (PCWA 2001). Fifteen boat access sites (for small craft) also are available on the lake.

When the boat ramps become unavailable, boating is restricted to small craft that can be carried to and from the shore. The boat ramps are most commonly inoperable in the winter months, when use is minimal or the reservoirs are inaccessible due to snow.

3.7.3 Middle Fork and North Fork American Rivers

The Middle Fork American River below Ralston Afterbay lies within the Auburn State Recreation Area (SRA) and extends 24 miles downstream to the confluence with the North Fork American River. The Middle Fork American River is the most popular river in the Auburn SRA for whitewater boating. Water released from the PCWA MFP through Ralston Afterbay supports river rafting, kayaking, and canoeing throughout the year. PCWA has an informal arrangement with Middle Fork American River commercial whitewater companies to release water from Ralston Afterbay on weekend mornings to augment flows down the river for whitewater use. Releases of 1,000 to 1,100 cfs typically are released beginning at 7:00 am and continue to be released for several hours, depending upon water operations (Anderson 1998). Water released at 7:00 am usually reaches the confluence of the Middle and North Forks at approximately 3:00 pm. The released water provides boating opportunities along the Middle Fork American River. The releases are particularly important during the summer and early fall months when river flows may be below 300 cfs. Adequate flows for whitewater boating are

about 1,000 cfs, and the minimum flow needed is approximately 800 cfs (Anderson 1998; Cassady and Calhoun 1995).

Most whitewater boating occurs during the summer (97 percent of the year's whitewater use), with the boating season beginning in late May and extending into September (CDPR and Reclamation 1992). The majority of the river reaches in the Middle Fork American River tend to be difficult for boaters and require intermediate to advanced skill levels, or the services of a commercial rafting company (Anderson 1998). Boating and other water-related activities are discouraged on the North Fork downstream of the confluence with the Middle Fork, and prohibited within the area one-half mile upstream and one-half mile downstream of the Auburn Dam construction by-pass tunnel due to safety hazards associated with the tunnel (Anderson 1998; CDPR and Reclamation 1992). Riparian vegetation along these rivers provides sightseeing, bird watching, and photographic opportunities. Other river-related uses that occur in the area include fishing, swimming, hiking, and sunbathing.

3.7.4 Folsom Reservoir and Lake Natoma

The California Department of Parks and Recreation (CDPR) manages the Folsom Lake SRA, which includes Folsom Reservoir and Lake Natoma. The Folsom Lake SRA is heavily utilized due to its proximity to a rapidly growing metropolitan area; the hot, dry summer climate of the area; the high recreational interest of the surrounding population; the diminishing open space; and its convenience as a recreational resource. There are 176 campsites that accommodate tent, trailer, RV and group campers; 11 day-use areas; and over 90 miles of existing trails in the Folsom Lake SRA (Reclamation 2005).

Visitation peaks during the summer and diminishes during the fall and winter. Seventy-five percent of all visits to the SRA occur during the spring and summer months. Use in 2000 at the Folsom SRA was more than 1.5 million visitors. Water-enhanced (land-based) activities at the SRA account for approximately 15 percent of the total recreation demand, and water-dependent activities account for nearly 85 percent. Water-dependent activities on Folsom Lake include boating, personal watercraft use (jet skis), windsurfing, water skiing, rafting, swimming, and fishing. On Lake Natoma, water-dependent activities include paddling (kayaking, rowing, canoeing, and outriggers), swimming, and fishing. Boating accounts for approximately 30 percent of the total recreation demand at the Folsom Lake SRA, swimming and wading account for 27 percent, fishing accounts for nearly 20 percent, and 23 percent consists of picnicking, camping, and miscellaneous water-dependent activities (Reclamation 2005).

Approximately 75 percent of the annual visitation to the Folsom SRA occurs during the spring and summer seasons. During these months, the reservoir experiences relatively high surface water temperatures. Existing reservoir water has little movement and the newer (colder) water tends to sink to the bottom of the reservoir, resulting in noticeably warmer surface temperatures. Surface water temperatures during the peak visitation period (June through August) range from 68°F to 76°F (20°C to 24.4°C).

Recreation use and quality of the Folsom Lake SRA are closely related to Folsom Lake's function as a flood control, irrigation, and water supply reservoir, particularly as it relates to water surface elevations of the lake. Folsom Lake water surface elevations directly affect the availability of boat ramps, beaches, berth sites, and other facilities that depend on water depth or surface area. These elevations can vary as much as 70 feet in normal years. The highest

surface elevations occur during the rainy season and spring run-off during late winter and early spring. The lowest surface elevations occur during late fall or early winter prior to the beginning of the rainy season. The surface water elevations drop continuously from the beginning of the recreation season (Memorial Day) through the end of the season (Labor Day). Surface elevations during normal years generally fall from an elevation of approximately 466 feet msl at the beginning of the season to a low of approximately 405 feet msl in late fall, after the season has ended (Reclamation 2005).

Major facilities at Folsom Lake include six developed boat-launching areas, one marina, and two formal beach areas. If Folsom Lake's surface water elevation stays above approximately 405 feet msl, berthing slips for year-round mooring are available. When reservoir elevations rise higher than about 450 feet msl, lake inundation results in nearshore boat ramps and parking spaces becoming unavailable, affecting the carrying capacity of the reservoir. When reservoir water levels decline below 436 feet msl, submerged boat ramps become exposed and can become unusable when the surface water elevation drops to approximately 420 feet msl. Summer is the most sensitive time to changes in water surface elevations because a lack of access to a recreational facility could occur (Reclamation 2005).

Lake Natoma is located at the downstream end of the Folsom Lake SRA. Nimbus Dam and Lake Natoma regulate releases to the lower American River while allowing varied water releases from Folsom Dam so that power production benefits can be optimized. The water surface elevation typically fluctuates 4 feet to 7 feet daily. Recreation use on Lake Natoma is less affected than at Folsom Lake due to the minimal changes in water surface elevation (Reclamation 2005).

Major facilities at Lake Natoma include three boat launching areas, formal beaches at Negro Bar and Nimbus Flat, and the California State University, Sacramento Aquatic Center just upstream of Nimbus Dam. The Aquatic Center provides instruction and equipment rentals for rowing, sailboarding, canoeing, and small boat sailing. Other Lake Natoma facilities include several picnic areas and an 8-mile segment of the American River paved trail that is used by equestrians, hikers, runners, mountain bikers, and in-line skaters. Bank fishing is common, and swimming and diving occur from the rock outcrops at the upper end of the lake. The predominant recreational activity is trail use (jogging, bicycling, hiking, and horseback riding). Summer water temperatures in Lake Natoma are generally much cooler than in Folsom Lake. Therefore, Lake Natoma is less intensely used for swimming and wading (Reclamation 2005).

Lake Natoma supports an average of a half-million visitor-days per year, which is greatest during the spring and summer. Water-enhanced activities account for approximately 50 percent of all recreation activities, and water-dependent activities account for the remaining 50 percent. Trail use accounts for 33 percent of the total recreation demand, rafting and boating account for 30 percent, swimming and wading account for 12 percent, picnicking and related activities account for 10 percent, fishing accounts for 8 percent, and nature study/sightseeing accounts for 7 percent of the total recreation demand (Reclamation 2005).

3.7.5 Lower American River

Recreational opportunities along the lower American River primarily are associated with the American River Parkway (Parkway). The 23-mile Parkway parallels the lower American River from Nimbus Dam to the confluence with the Sacramento River. The Parkway includes 14

parks along the publicly owned lands of the river. The County of Sacramento operates and maintains facilities within the Parkway downstream of Nimbus Dam, and CDPR operates and maintains facilities upstream of the dam. The Parkway is recognized as one of the nation's premier urban parkways, providing outstanding recreational opportunities for Sacramento area residents.

The most popular feature of the Parkway is the Jedediah Smith Memorial Trail – more commonly known as the American River Bike trail – that extends 32 miles east from Discovery Park in Sacramento to Beal's Point in the Folsom Lake SRA. This trail offers hikers, cyclists, and horseback riders opportunities for outdoor recreation, nature viewing, and relaxation. The American River is popular with fishing enthusiasts, canoeists, kayakers, and rafters, and the Parkway offers several picnic areas, and opportunities for nearby golf, guided natural and historic tours, archery, and game fields.

More than five million visitors use the Parkway each year and visitation is expected to increase to approximately 10 million users by 2010, assuming stable river flows are available. Approximately 31 percent of all visits were associated with water-dependent activities (swimming, boating, and fishing), and 69 percent were associated with water-enhanced activities (jogging, nature study, hiking, and picnicking) (Reclamation 2005).

The lower American River has been designated as a Wild and Scenic River pursuant to both the State and Federal Wild and Scenic River Acts. This designation prohibits federal construction, assistance, and licensing of water resource projects that would adversely affect the values for which the designated river segments are included in the national system. The lower American River is a major site for recreational boating (rafting, kayaking, and canoeing). The level of lower American River boating activity, particularly commercial rafting, primarily depends on air temperature, river flows, and season. The boating and rafting season generally is between April and October. Fishing is permitted in the Parkway year-round except during fall and early winter, when portions of the river are closed to protect spawning fish. Swimming and wading are other popular water-dependent activities affected by river flows. There are 10 popular swimming areas along the river, although only Paradise Beach and Tiscornia Park have large sand beach areas.

3.7.6 Long-Term Warren Act Service Area

Due to the nature of land uses and zoning within the long-term WA service area, recreational opportunities exist primarily on specified parcels of land. Local recreation and park districts provide both park and open space areas. Parks within the service area contain recreational facilities such as baseball fields, playgrounds, exercise courses, tennis and volleyball courts, picnic benches and barbecues, restrooms, and open play areas. In addition, several of the local park and recreation districts manage open space areas such as Gibson Ranch Park and Arcade Creek Nature Area. Specific locations within the service area also offer such amenities as golf centers, horse arenas, fishing ponds, and hiking trails. The Sacramento County Department of Parks, Recreation, and Open Space oversees various park and open space resources, which are managed by local recreation and park districts. In addition to the larger parks listed in **Table 3-3**, many smaller parks exist with the service area. The function of, and services provided by these "pocket parks" are similar to those listed for the larger parks serviced by the Sacramento County, Rio Linda/Elverta, Arcade, and Citrus Heights Recreation and Parks Departments.

Table 3-3. Parks and recreation facilities within the long-term WA service area.

Recreation and Park District	Park	Park Amenities
Sacramento County Department of Recreation, Parks, and Open Space and the Rio Linda/Elverta Parks District	Dry Creek Parkway Cherry Island Gibson Ranch Northbrook Park	Open space, equestrian, pedestrian, and bicycle trails, golf course, soccer fields, picnic areas, barbeques, and restrooms, animal husbandry, riding stables, lake with fishing docks
Arcade Creek	Hamilton Street Park Arcade Creek Park- including Arcade Creek Nature Area Oakdale Park	Tennis and basketball courts, play area, fields, picnic tables, recreation center, soccer and softball fields
City of Citrus Heights (park and recreation services provided by Sunrise Recreation and Park District)	Antelope Community Park Brooktree Park Crosswoods Community Park Foothill Community Park Foothill Golf Center	Playing fields, play areas, picnic facilities, open space parks, recreation buildings

Dry Creek Parkway, a portion of which is located in the northwestern corner of the long-term WA service area, has been recognized as an important open space corridor and recreation resource for over 35 years. The Dry Creek Parkway Recreation Master Plan, developed by the County of Sacramento's Department of Parks, Recreation, and Open Space, includes expanding upon the current recreational opportunities provided by Dry Creek Parkway, as well as possible construction of a six-mile trail system extending from the Sacramento/Placer County line to the Sacramento City limits at Ascot Lane. Generally, the boundary of Dry Creek Parkway extends approximately 175 feet beyond the natural bank of Dry Creek. The Parkway also encompasses such existing recreational parks and facilities as the Cherry Island Soccer Complex, Cherry Island Golf Course, Gibson Ranch, and Northbrook Park (County of Sacramento Department of Regional Parks, Recreation and Open Space 2002).

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter identifies and discusses potential impacts on environmental resources that may occur with implementation of the Proposed Action and the No Action Alternative. The No Action Alternative assumes no execution of a long-term WA contract; however SSWD would continue to request annual conveyance of up to 10,000 AFA of PCWA MFP water through the federal facilities at Folsom Dam under temporary WA contracts on a yearly basis.

This joint environmental document recognizes that insofar as potential impacts to resources within the SSWD long-term WA service area are concerned, the Proposed Action would result in no independently related effects to resources within the long-term WA service area. The Proposed Action, as defined, within the quantities of water intended for federal "wheeling," is designed to meet both existing and near future planned water needs within the context of an approved General Plan. The Proposed Action does not require construction activities, nor would it directly result in construction activities or land conversions. Indirectly, the long-term WA service area would undergo continual changes to its various resources and services as it maintains its current growth trends. This joint environmental document does not re-evaluate long-term impacts associated with planned growth within the long-term WA service area, as was assessed in the Sacramento County General Plan EIR and City of Citrus Heights General Plan EIR.

Without the water supply facilitated through this long-term WA contract, the SSWD long-term WA service area would continue to rely on groundwater to meet its existing water demands in most years, and to achieve its projected and approved General Plan growth. Impacts to resources, activities, services, and the quality of life within the long-term WA service area have already been addressed in the environmental review and approval processes associated with General Plan approval. Therefore, no impacts to any of the resources within the long-term WA service area would be a direct result of the Proposed Action. The Proposed Action would accommodate the long-term WA service area's already planned and approved growth.

4.1 APPROACH FOR IMPACTS ANALYSIS

The analyses undertaken in this joint environmental document relied upon baseline information developed from several sources, including NMFS, USFWS, CDFG, and various County environmental and planning documents. For the hydrological analysis included as Appendix C, various hydrologic modeling tools were utilized to quantify potential changes in the hydrologic system and to aid in the analysis of potential effects on environmental resources. The hydrologic analysis utilized output from: (1) the Reclamation and DWR operations and planning model for the CVP/SWP system (CALSIM II); (2) the Upper American River Model for the Middle Fork Project/Upper American River Project system; (3) a reservoir storage and flow post-processing spreadsheet tool (Hydrologic Post-Processing Tool); and (4) water temperature models for lower American River water temperature (Reclamation's Water Temperature Model with ATSP and the Coldwater Pool Management Model). These models were used to simulate hydrologic conditions within the action area waterbodies under Proposed Action and No Action Alternative conditions. This section describes the framework used for the hydrologic analysis, impact assessment comparisons, and endangered species evaluation.

The Proposed Action, as defined, intends to utilize a portion of PCWA's water rights water from the MFP to achieve groundwater stabilization within northern Sacramento County and southwestern Placer County. The fundamental premise of the impact assessment approach used in this EA is the recognition that the exercise of PCWA's water rights for this project benefits Placer County by achieving the most efficient and effective means of stabilizing the groundwater basin underlying both southwestern Placer and northern Sacramento counties. Groundwater modeling results illustrate that the most effective means of stabilizing the regional aquifer through in-lieu groundwater recharge is to reduce groundwater pumping in the area of the existing cone of depression (i.e., McClellan).

The approach for impacts analysis recognized that PCWA's water rights could be appropriately used as proposed for this project to protect its regional groundwater resources. The exercise of these rights by PCWA to address an area-of-origin concern may, in certain instances, reduce the water available to Reclamation at Folsom Reservoir. However, Reclamation has the capability, within the operational flexibility of the CVP, to adjust its CVP operations to ensure that no hydrologic-related environmental impacts occur. This flexibility is illustrated in the Groundwater Stabilization Project EIR (PCWA and NWD 1998), which depicted Reclamation's ability to meet its contractual and regulatory obligations within the context of PCWA (and others) exercising their water rights.

In addition, as participants in the Water Forum, both SSWD and PCWA have committed to reducing their proposed water deliveries associated with the Proposed Action during dry years. These reductions are as conditioned in the stipulated agreement with Reclamation (see Chapter 2 for additional discussion).

4.2 WATER SUPPLY AND HYDROLOGY

4.2.1 Diversion-Related Impacts

Potential impacts to CVP/SWP water supply deliveries resulting from implementation of the Proposed Action were identified and evaluated relative to the No Action condition (2020 levels of demand). The impact analysis focused on potential changes to annual water deliveries to contractors within the CVP and SWP, and non-CVP American River water users.

The analysis of potential effects on water supply and hydrology associated with implementation of the Proposed Action was based on reductions in reservoir storage or river flows, relative to the No Action condition, of significant frequency and duration to adversely affect delivery allocations (water supply availability) for CVP and SWP customers, and non-CVP American River water users.

Proposed Action

French Meadows Reservoir

With implementation of the Proposed Action, average end-of-month storage at French Meadows Reservoir during those years of project operation would decrease by up to 1,000 AF (1 percent) during May, July, and August, relative to the No Action condition (Table C-2 in Appendix C). The storage in French Meadows Reservoir under No Action conditions ranges from a minimum of 48,000 AF in October during critical water years to a maximum of 135,000 AF in May during wet water years. The maximum projected decrease in reservoir storage

under the Proposed Action would be 5,000 AF (10 percent) in October, November, and December during critical water years, corresponding to a decrease in surface water elevation of 3 to 4 feet.

French Meadows Reservoir surface water elevation records are available from the USGS Hydrological Data Report for the period extending from 1964 through 2001. The anticipated decreases in surface water elevations (and associated storage) under the Proposed Action would be within the range of normal operations as indicated by the historic surface water elevation records for French Meadows Reservoir (USGS Website 2005b). In addition, French Meadows Reservoir would not be drawn down below the minimum water levels required by FERC orders. The amount of water released from French Meadows Reservoir is limited such that the drawdown required would not reduce carryover storage below a level sufficient to meet local needs and instream flow requirements. Under the Proposed Action, potential changes in French Meadows Reservoir storage and surface water elevations would not be of substantial magnitude or duration, relative to the No Action condition, to adversely affect water supply availability for CVP and SWP customers, and non-CVP American River water users. Therefore, potential impacts on water supply availability at French Meadows Reservoir would be ***less than significant*** with implementation of the Proposed Action, relative to the No Action Alternative.

Hell Hole Reservoir

With implementation of the Proposed Action, average end-of-month storage at Hell Hole Reservoir during those years of project operation would decrease by up to 11,000 AF (7 percent) during April, relative to the No Action condition (Table C-6 in Appendix C). The storage in Hell Hole Reservoir under No Action conditions ranges from a minimum of 66,000 AF in December during critical water years to a maximum of 208,000 AF in June during wet water years. The maximum projected decrease in reservoir storage under the Proposed Action would be 19,000 AF (29 percent) in December during critical water years, corresponding to a decrease in surface water elevation of 30 feet.

Hell Hole Reservoir surface water elevation records are available from the USGS Hydrological Data Report for the period extending from 1965 through 2001. The anticipated decreases in surface water elevations (and associated storage) under the Proposed Action would be within the range of normal operations as indicated by the historic surface water elevation records (USGS Website 2005a). In addition, Hell Hole Reservoir would not be drawn down below the minimum water levels required by FERC orders. The amount of water released from Hell Hole Reservoir is limited such that the drawdown required would not reduce carryover storage below a level sufficient to meet local needs and instream flow requirements. Under the Proposed Action, potential changes in Hell Hole Reservoir storage and surface water elevations would not be of substantial magnitude or duration, relative to the No Action condition, to adversely affect water supply availability for CVP and SWP customers, and non-CVP American River water users. Therefore, potential impacts on water supply availability at Hell Hole Reservoir would be ***less than significant*** with implementation of the Proposed Action, relative to the No Action Alternative.

Folsom Reservoir and the Lower American River

With implementation of the Proposed Action, Folsom Reservoir storage and surface water elevations would not change during those years of project operation or during wet, above,

normal, below normal, dry, or critical water years (Table C-13 and Table C-14 in Appendix C). As described in Section 5.2 and Section 5.3 of Appendix C, during those months when Folsom Reservoir inflows would be reduced, Folsom spills would be reduced to compensate for the reduction in inflow, thus maintaining Folsom Reservoir storage and surface water elevations under the Proposed Action, relative to the No Action condition. This analysis illustrates that re-operation of the CVP/SWP system would not be required with implementation of the Proposed Action due to the availability of surplus flows in the system to maintain water supply deliveries under both Proposed Action and No Action conditions. No changes in release from Folsom Reservoir would occur, except for minor changes in the frequency and magnitude of spill events (Table C-18 and Table C-19 in Appendix C). Therefore, ***no impacts*** on water supply availability are anticipated at Folsom Reservoir and the lower American River with implementation of the Proposed Action, relative to the No Action Alternative.

No Action Alternative

There would be no change in water diversions under the No Action Alternative relative to the existing condition. Identical hydrology and operations between No Action and existing conditions would result in no change in water deliveries to CVP and SWP customers and non-CVP American River water users. Therefore, implementation of the No Action Alternative would result in ***no impacts*** on water supply.

4.2.2 Long-Term Warren Act Service Area Impacts

From a water supply perspective, the Proposed Action, in and of itself, is intended to facilitate the acquisition of a long-term sustainable supply to meet current and future anticipated approved growth within the SSWD long-term WA service area. The Proposed Action would reduce reliance on groundwater resources within southwestern Placer County and the SSWD service area through a substitute surface water supply provided by PCWA, as available. The Proposed Action would provide SSWD and others with the operational flexibility to better meet their existing and future water demands through a combination of CVP and non-CVP surface water supply deliveries, resulting in reduced reliance on groundwater withdrawals to provide water supplies within northern Sacramento County. Therefore, the Proposed Action would result in ***beneficial impacts*** on water supply within the SSWD long-term WA service area, relative to the No Action Alternative.

With implementation of the Proposed Action, surface water supplies would replace groundwater pumping within the long-term WA service area. This would contribute to the abatement of the current overdraft condition in the aquifer during most water years and promote positive groundwater recharge. Average annual pumping would decrease by up to 19,000 AF under the Proposed Action, relative to No Action conditions. Because the Proposed Action would relieve the current groundwater basin overdraft, ***no adverse impacts*** associated with groundwater recharge are anticipated under the Proposed Action, relative to the No Action Alternative.

A primary concern of stabilizing groundwater levels is associated with the potential for further migration of the groundwater contaminant plume beneath and adjacent to McClellan. The contamination plume under McClellan is currently being remediated by the Department of the Air Force. The remediation currently in place includes a number of extraction wells intended to contain existing contaminant plumes and to remove contaminant mass from the groundwater. As part of the remedial action, the Department of the Air Force has installed a network of

monitoring wells. The wells are monitored to evaluate the effectiveness of the remediation system and to identify any changes in the hydrogeologic conditions that could affect system performance. The Department of the Air Force is required under CERCLA to modify the system as necessary to address any changing conditions, including any changes that might result from implementation of the Proposed Action. The effects of the positive groundwater recharge on the existing contaminant plumes, if they resulted in groundwater contaminant migrations, would be captured by the existing and continual remedial efforts of the Department of the Air Force at McClellan. Therefore, potential impacts on groundwater quality with implementation of the Proposed Action would be ***less than significant***, relative to the No Action Alternative.

4.2.3 Mitigation Measures

With no anticipated water supply impacts to CVP and SWP customers and non-CVP American River water users as a result of the Proposed Action, no mitigation measures are necessary or recommended.

4.3 POWER SUPPLY

4.3.1 Diversion-Related Impacts

Potential power supply impacts include changes in CVP hydroelectric power generation and capacity, changes in pumping energy use by diverters that pump water from Folsom Reservoir, and changes to energy use within the project area. No other potential effects on power generation or demand are anticipated with implementation of the Proposed Action, with the exception of potential increases in the use of energy resources for pumping, conveyance, and treatment of the new water supply.

Changes in CVP power at the Folsom Power Plant could occur as the result of either a change in water surface elevation (head), which affects electrical capacity or altered powerplant (penstock) releases, which affect electrical generation. Changes to pumping energy use by Folsom Reservoir diverters also could result from changes in surface water elevation. Lowering the reservoir's water surface would create an increase in pumping lift so that the amount of energy required to move the water also would increase. The substitution of surface water with its possible associated pumping energy use, for groundwater with a different pumping energy use, may also effect a change in total energy use within the project area.

Hydropower impacts may result from a reduction in hydropower generation, an increase in pumping energy use by Folsom Reservoir diverters, or an increase in electrical energy use in the project area. Reduction in CVP generation would be a cost impact either because Western would be precluded from selling excess energy or would be required to purchase additional energy for its customers. This analysis assumes that impacts would be significant if hydropower generation were substantially reduced, pumping energy requirements for Folsom Reservoir diverters were substantially increased, or electrical energy use were substantially increased, with implementation of the Proposed Action, relative to the No Action Alternative.

Proposed Action

CVP Hydropower Generation

With implementation of the Proposed Action, Folsom Reservoir storage and surface water elevations would not change during those years of project operation or during wet, above, normal, below normal, dry, or critical water years (Table C-13 and Table C-14 in Appendix C). As described in Section 5.2 and Section 5.3 of Appendix C, during those months when Folsom Reservoir inflows would be reduced, Folsom spills would be reduced to compensate for the reduction in inflow, thus maintaining Folsom Reservoir storage and surface water elevations under the Proposed Action, relative to the No Action condition. No changes in release from Folsom Reservoir would occur, except for minor changes in the frequency and magnitude of spill events (Table C-18 and Table C-19 in Appendix C), which would have no affect on hydropower generation at the Folsom or Nimbus power plants. Therefore, ***no impacts*** on CVP power generation are anticipated with implementation of the Proposed Action, relative to the No Action Alternative.

Middle Fork Project Hydropower Generation

The typical monthly demand pattern included in the Proposed Action is consistent with the allowable monthly distribution of diversions as specified in the power purchase agreement between PCWA and PG&E. The release of surface water from the MFP would generate increased power production under the Proposed Action, relative to the No Action condition. Increased flows through the French Meadows, Hell Hole, and Oxbow power plants would be used for power generation, first to increase the number of hours of on-peak generation, then to increase off-peak generation, and would allow PG&E to produce additional power. The Oxbow Power Plant is used at full capacity of about 1,000 cfs during the on-peak hours, which are typically daytime hours (especially afternoon and evening), and turned off for the rest of the day. Water transferred under the Proposed Action would result in the powerhouse being used at capacity for more time during the day. The minimum and maximum flow rates for the day would remain the same; only the duration of the maximum flow would increase with implementation of the Proposed Action, relative to the No Action condition. Potential increases in power generation at the French Meadows, Hell Hole, and Oxbow power plants would result in a ***beneficial impact*** on MFP power generation with implementation of the Proposed Action, relative to the No Action Alternative.

Pumping Energy Requirements

The Folsom Pumping Plant and the EID Pumping Plant lift water from Folsom Reservoir up to treatment plants for treatment and distribution. The Proposed Action would not result in changes to surface water elevations in Folsom Reservoir, therefore no increase in energy to provide the required pumping would occur with implementation of the Proposed Action, relative to the No Action condition.

An increase in energy requirement at the Folsom Pumping Plant would be expected under the Proposed Action, because SSWD would be using these facilities to pump the increased diversion of 19,000 AF. Because Folsom Reservoir elevations would not change under the Proposed Action, relative to the No Action condition, the increase in energy requirement at Folsom Pumping Plant would be due entirely to the increased diversion by SSWD. In this case, the beneficiaries of the increased diversion (SSWD) would be the only party financially

responsible for the increased energy requirement. This results in ***no impacts*** on pumping energy requirements for any third party.

Area Energy Use

Water diverted under the Proposed Action would be pumped at Folsom Dam. Although pumping would not be required continuously (during most months, gravity flow is possible), a new energy load would be created in the area during some months of the year. The new energy load created from pumping at Folsom Dam, together with the energy required for associated treatment and distribution, would be offset by reduced groundwater pumping by SSWD within its existing groundwater supply infrastructure. On an acre-foot basis, the energy use for delivering water from Folsom Reservoir is expected to be less than the energy use for groundwater pumping (PCWA and NWD 1998).

Therefore, overall impacts on power supply would be ***less than significant*** with implementation of the Proposed Action, relative to the No Action Alternative.

No Action Alternative

No change in hydrology or operations would occur under the No Action Alternative, therefore there would be no change in either hydropower or pumping energy requirements. Implementation of the No Action Alternative would result in no power supply impacts on CVP hydropower generation and capacity or pumping energy requirements, relative to the existing condition.

4.3.2 Mitigation Measures

No adverse impacts on CVP or MFP hydropower generation, pumping energy requirements, or area energy use as a result of the Proposed Action are anticipated, therefore no mitigation measures are necessary or recommended.

4.4 FISHERIES AND AQUATIC RESOURCES

The analysis of potential effects on fisheries and aquatic resources includes an assessment of the coldwater fisheries of French Meadows and Hell Hole reservoirs, the warmwater and coldwater fisheries of Folsom reservoirs, and an assessment of fishery resources of the Middle Fork American River below Ralston Afterbay, the North Fork American River below the confluence with the Middle Fork American River, the lower American River below Nimbus Dam to its confluence with the Sacramento River, and within the long-term WA service area. Of the listed, proposed listed, and candidate fish species under the federal ESA having the potential to occur within the action area, delta smelt, green sturgeon, and winter-run Chinook salmon do not occur within the action area and are not discussed in this analysis.

Populations of spring-run Chinook salmon were previously assumed to be restricted to accessible reaches in the upper Sacramento River mainstem, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and the Yuba River (CALFED 2000b; CDFG 1998; 218 FR 68725 (2002); 6 FR 1116 (2002); USFWS 1998). However, spring-run Chinook salmon juveniles have been observed rearing in non-natal tributaries and intermittent streams during winter months (NMFS 2004), and the lower 10 miles of the American River has been designated as critical habitat for spring-run

Chinook salmon. Critical habitat considerations for spring-run Chinook salmon are addressed in the analysis for fall-run Chinook salmon and steelhead in the lower American River.

4.4.1 Diversion-Related Impacts

During the period when French Meadows, Hell Hole, and Folsom reservoirs are thermally stratified (approximately April through November), coldwater fishes within these reservoirs reside primarily within the reservoir's metalimnion and hypolimnion where water temperatures remain suitable. Reduced reservoir storage (measured in thousand acre-feet [TAF]) during this period could reduce the reservoir's coldwater pool volume, thereby reducing the quantity of habitat available to coldwater fish species during these months. Reservoir coldwater pool size generally decreases as reservoir storage decreases, although not always in direct proportion because of the influence of reservoir basin morphometry. The analysis of potential impacts on the coldwater fisheries in these reservoirs was based on decreases in reservoir storage, which also would reduce the coldwater pool, of sufficient magnitude or duration to adversely affect long-term population levels of coldwater fish for a given month during the April through November period.

The spawning period for warmwater fish is believed to generally extend from March through June. However, the majority of warmwater fish spawning occurs during the months of April and May. Adverse effects on warmwater fish spawning in Folsom Reservoir are assumed to have the potential to occur when reservoir elevations decrease to the extent that nest-dewatering occurs during the spawning period. The analysis of potential impacts on warmwater fisheries in Folsom Reservoir was based on decreases in reservoir surface water elevation of sufficient magnitude or frequency to adversely affect long-term population of warmwater fish for a given month during the extended March through June spawning period, and especially during the primary spawning period of April and May.

Instream flows and water temperatures are important parameters related to the production and condition of aquatic resources in riverine environments. Instream flows, and the magnitude and duration of flow fluctuation events, may affect fish populations, particularly salmonid populations, by determining the amount of available habitat or altering the timing of life history events (e.g., spawning). Rapid changes in flow have the potential to affect the survival of eggs and alevins by exposing redds, and rapidly receding flow conditions may strand juveniles in pools and side channels or on beach substrates where desiccation, rapidly increasing water temperature, and predation may affect overall survival. In addition, water temperatures influence metabolic, physiologic, and behavioral patterns, as well as fecundity and overall spawning success of fish populations (PCWA 2003). The evaluation of potential impacts to fisheries and other aquatic resources in the Middle Fork and North Fork American rivers was based on decreases in river flows and increases in river water temperatures of sufficient magnitude or duration to adversely affect long-term population levels of river fisheries for a given month.

The primary factor potentially limiting fall-run Chinook salmon and steelhead production within the lower American River is believed to be high water temperatures during portions of their freshwater residency in the river. Warm water temperatures during the fall can delay the onset of spawning by adult fall-run Chinook salmon, and water temperatures can become unsuitably warm for juvenile salmon rearing during spring and juvenile steelhead rearing during summer. In addition, relatively low October and November flows, when they occur,

tend to increase the amount of fall-run Chinook salmon redd superimposition, thereby potentially limiting initial year-class strength.

The impacts analyses focused on determining potential effects to anadromous salmonids in the lower American River because fall-run Chinook salmon and steelhead life history requirements generally are more restrictive than those of other fish species found in the river. Thus, if these species (i.e., fall-run Chinook salmon and steelhead) are not adversely affected by implementation of the Proposed Action, it is unlikely that other, less sensitive fish species would be adversely affected. The evaluation of potential impacts to fall-run Chinook salmon and steelhead in the lower American River was based on changes in instream flows and water temperatures of sufficient magnitude or duration to adversely affect fall-run Chinook salmon and steelhead adult immigration, spawning and embryo incubation, and juvenile rearing and emigration for a given month. In addition, the evaluation of potential impacts to American shad and striped bass was based on changes in instream flows and water temperatures of sufficient magnitude or duration to adversely affect American shad adult immigration and spawning and striped bass adult spawning, embryo incubation, and initial rearing during May and June.

Proposed Action

French Meadows Reservoir

With implementation of the Proposed Action, average end-of-month storage at French Meadows Reservoir during those years of project operation would decrease by up to 1,000 AF (1 percent) during May, July, and August, relative to the No Action condition (Table C-2 in Appendix C). The maximum projected decrease in reservoir storage under the Proposed Action during April through November would be 5,000 AF (10 percent) in October and November during critical water years.

French Meadows Reservoir surface water elevation records are available from the USGS Hydrological Data Report for the period extending from 1964 through 2001. The anticipated decreases in surface water elevations (and associated storage) under the Proposed Action would be within the range of normal operations as indicated by the historic surface water elevation records for French Meadows Reservoir (USGS Website 2005b). In addition, the anticipated decreases in reservoir storage would not be expected to adversely affect the reservoir's coldwater fisheries because: (1) coldwater habitat would remain available within the reservoir during all months of the April through November period; (2) physical habitat availability is not believed to be among the primary factors limiting coldwater fish populations; and (3) anticipated seasonal reductions in storage would not be expected to adversely affect the primary prey species utilized by coldwater fishes. Therefore, changes in end-of-month storage at French Meadows Reservoir under the Proposed Action would not result in adverse affects to coldwater fish resources. Therefore, changes in end-of-month storage that could occur under the Proposed Action would result in a ***less than significant*** impact on French Meadows Reservoir's coldwater fisheries, relative to the No Action Alternative.

Hell Hole Reservoir

With implementation of the Proposed Action, average end-of-month storage at Hell Hole Reservoir during those years of project operation would decrease by up to 11,000 AF (7 percent) during April, relative to the No Action condition (Table C-6 in Appendix C). The maximum

projected decrease in reservoir storage under the Proposed Action during April through November would be 20,000 AF in April (19 percent), May (17 percent), June (18 percent), July (20 percent), and October (27 percent) during critical water years.

Hell Hole Reservoir surface water elevation records are available from the USGS Hydrological Data Report for the period extending from 1965 through 2001. The anticipated decreases in surface water elevations (and associated storage) under the Proposed Action would be within the range of normal operations as indicated by the historic surface water elevation records (USGS Website 2005a). In addition, the anticipated decreases in reservoir storage would not be expected to adversely affect the reservoir's coldwater fisheries because: (1) coldwater habitat would remain available within the reservoir during all months of the April through November period; (2) physical habitat availability is not believed to be among the primary factors limiting coldwater fish populations; and (3) anticipated seasonal reductions in storage would not be expected to adversely affect the primary prey species utilized by coldwater fishes. Therefore, changes in end-of-month storage at Hell Hole Reservoir under the Proposed Action would not result in adverse affects to coldwater fish resources. Therefore, changes in end-of-month storage that could occur under the Proposed Action would result in a ***less than significant*** impact on Hell Hole Reservoir's coldwater fisheries, relative to the No Action Alternative.

Middle Fork and North Fork American Rivers

With implementation of the Proposed Action, average flow in the Middle Fork American River below Ralston Afterbay during those years of project operation would decrease by 100 cfs (4 percent) during May, 10 cfs (1 percent) during June, and 34 cfs (4 percent) during September, and would increase by 40 cfs during July and 41 cfs during August (4 percent), relative to the No Action condition (Table C-10 in Appendix C). The maximum projected decrease in flow under the Proposed Action would be 113 cfs (8 percent) during May in below normal water years. The maximum projected increase in flow under the Proposed Action would be 37 cfs (3 to 4 percent) during July and August in above normal water years. There would be no decreases in flow below Ralston Afterbay during critical water years with implementation of the Proposed Action, relative to the No Action condition, and flows during July and August would increase during wet, above normal, below normal, and dry water year types.

During summer, instream flows generally are low during June and July and approach base flow conditions during August and September. Under low flow and base flow conditions, the river is shallower than at other times of the year and there is a greater surface-to-volume ratio, which promotes ambient heating from solar radiation. The resulting increased water temperatures are a potential stressor to fish and other aquatic organisms.

The overall general increased discharge under the Proposed Action would result in a temporal increase in exposure to higher daily flows, thus decreasing the amount of time that fish and other aquatic organisms are exposed to daily base flow conditions during summer. The Proposed Action also will increase the volume of cold water released from Oxbow Reservoir (Ralston Afterbay). This additional cold water flow contribution may help to lower water temperatures in the river reach immediately downstream of the dam and would continue to lessen the effects to the thermal gradient in downstream river reaches by reducing the amount of ambient downstream warming. More importantly, the additional flow contribution would reduce the high surface-to-volume ratio in the downstream reaches of the Middle Fork American River. This would be expected to reduce the amount of ambient downstream heating

that occurs in the river. By reducing instream water temperatures, the increased flow could enhance instream habitat conditions for rainbow and brown trout, a primary component of the coldwater fishery in the Middle Fork American River below Ralston Afterbay.

Periodic dewatering of the stream margins during hydroelectric peaking operations has been shown to limit the ability of aquatic invertebrates to colonize these areas and achieve the densities that occur in areas that are constantly submerged (Gislason 1985). Differences in flow regime may provide a partial explanation for somewhat higher aquatic invertebrate diversity (taxa richness) in the control reaches where flows are relatively stable during the summer and fall.

Operations of the MFP under existing conditions currently result in highly variable flows on a daily and weekly basis. The MFP is operated to achieve stable power production during weekdays, while weekend flows are increased substantially to provide sufficient flows for recreational activities in the river. It is assumed that releases under the Proposed Action would be managed to maximize power generation and, therefore, would be released during the week. Thus, increases in releases from MFP facilities increase flows during the week, thereby decreasing the difference between weekday and weekend flow conditions in the Middle Fork American River below Ralston Afterbay. Such changes in the flow regime would be likely to benefit the forage base of fish species in the Middle Fork American River. Aquatic invertebrates such as stoneflies, which may contribute to the forage base for fish, are more likely to successfully colonize and reproduce in an environment with more stable flow conditions.

Flows under the Proposed Action would not fluctuate beyond existing minimum and maximum ranges. Therefore, no impacts to aquatic macroinvertebrate habitat availability are anticipated, relative to the No Action condition. The increased flow releases under the Proposed Action would not increase the magnitude of flows in the Middle Fork American River and therefore, would not impact benthic macroinvertebrate assemblages, relative to the No Action condition. The magnitude or velocity of flow releases under the Proposed Action would not increase above current peaking levels; therefore, there is no additional risk of potentially disrupting or displacing benthic macroinvertebrates or suitable habitat, relative to the No Action condition. The relatively short duration (i.e. approximately two to three hours) of increased daily peak flows associated with the Proposed Action would not be expected to adversely affect benthic macroinvertebrate life stages or life history requirements. Additionally, the greater volume of coldwater associated with the increased releases from Oxbow Reservoir would likely result in less ambient heating and, in turn, could reduce thermal stress to benthic macroinvertebrates and other aquatic organisms. No adverse affects to Middle Fork American River fisheries resources are anticipated with implementation of the Proposed Action. Therefore, changes in flow below Ralston Afterbay that could occur under the Proposed Action would result in a ***less than significant*** impact on Middle Fork American River fisheries, relative to the No Action Alternative.

It is anticipated that the additional flow contribution under the Proposed Action would cause water temperatures in the North Fork American River to respond in a manner similar to what has been described for the Middle Fork American River below Oxbow Reservoir (Ralston Afterbay). Although a water temperature reduction may not be as great as that which would occur in the Middle Fork American River directly below Ralston Afterbay, reduced instream water temperatures could enhance instream habitat conditions for rainbow and brown trout,

the primary components of the coldwater fishery in the North Fork American River. No adverse affects to North Fork American River fisheries resources are anticipated with implementation of the Proposed Action. Therefore, changes in flow below Ralston Afterbay that could occur under the Proposed Action would result in a ***less than significant*** impact on North Fork American River fisheries, relative to the No Action Alternative.

Folsom Reservoir

With implementation of the Proposed Action, Folsom Reservoir storage and surface water elevations would not change during those years of project operation or during wet, above, normal, below normal, dry, or critical water years (Table C-13 and Table C-14 in Appendix C). As described in Section 5.2 and Section 5.3 of Appendix C, during those months when Folsom Reservoir inflows would be reduced, Folsom spills would be reduced to compensate for the reduction in inflow, thus maintaining Folsom Reservoir storage and surface water elevations under the Proposed Action, relative to the No Action condition. No changes in release from Folsom Reservoir would occur, except for minor changes in the frequency and magnitude of spill events (Table C-18 and Table C-19 in Appendix C). Therefore, ***no impacts*** on coldwater or warmwater fisheries are anticipated at Folsom Reservoir with implementation of the Proposed Action, relative to the No Action Alternative.

Nimbus Fish Hatchery

Operations of Folsom Dam and Reservoir under the Proposed Action would generally have little effect on water temperatures below Nimbus Dam, relative to the No Action condition. Under a worst-case water temperature scenario selected from the Coldwater Pool Management Model simulation for the year 1932 (see Appendix C for further information), the average water temperature would be 0.2°F colder at Watt Avenue with implementation of the Proposed Action, relative to the average water temperature under the No Action condition (Table C-22 in Appendix C). During May through September (when hatchery water temperatures reach seasonal highs annually), the largest increase in water temperature at Watt Avenue would be 1.2 °F in August with implementation of the Proposed Action, relative to the No Action condition. In addition, ambient heating of the water during the summer months that would occur from the time it was released from Folsom Dam until it reached Watt Avenue indicates that water temperatures at the Nimbus Fish Hatchery would be colder than those modeled at Watt Avenue under the worst case scenario.

On a long-term basis, the minor and infrequent changes in water temperature that could occur under a worst-case scenario during the May through September period would have little, if any, effect on hatchery operations and resultant fish production in most years. Therefore, the minor and infrequent increases in water temperature at the Nimbus Fish Hatchery that could occur under the Proposed Action would result in ***less than significant*** impacts, relative to the No Action Alternative.

Lower American River

As discussed above for Folsom Reservoir, no changes in release from Folsom Reservoir would occur, with implementation of the Proposed Action except for minor changes in the frequency and magnitude of spill events (Table C-18 and Table C-19 in Appendix C). Therefore, no flow-related impacts on lower American fisheries and aquatic resources are anticipated with implementation of the Proposed Action, relative to the No Action condition. However, changes in water temperatures with implementation of the Proposed Action could affect fish species of

primary management concern in lower American River. Under a worst-case water temperature scenario (see Appendix C for further information), the average water temperature would be 0.2ºF colder at Watt Avenue with implementation of the Proposed Action, relative to the average water temperature under the No Action condition (Table C-22 in Appendix C). Average river water temperatures at Watt Avenue would be less than 56°F during each month from December through April. Potential water temperature-related impacts on lower American River fish species under a worst-case scenario are discussed separately below by species and life stage.

Fall-Run Chinook Salmon

During the fall-run Chinook salmon adult immigration and holding period (September through November), mean weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would increase slightly on two occasions, and decrease slightly on 10 occasions, as shown in Table C-22 in Appendix C. During the adult spawning and embryo incubation period (October through February), mean weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would increase slightly on eight occasions, and decrease slightly on five occasions, as shown in Table C-22 in Appendix C. The largest increase in water temperature also would be 1.8 ºF (from 47.8ºF to 49.6ºF) during November with implementation of the Proposed Action, relative to the No Action condition. During the juvenile rearing and smolt emigration period (December through June) mean weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would remain the same on five occasions, increase slightly on 12 occasions, and decrease slightly on six occasions, as shown in Table C-22 in Appendix C. The largest increase in water temperature would be 0.4ºF (from 63.0ºF to 63.4ºF) during June, with implementation of the Proposed Action, relative to the No Action condition (Table C-22 in Appendix C).

Changes in water temperature in the lower American River under the Proposed Action during September through November would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon adult immigration and holding. Similarly, changes in water temperature under the Proposed Action during October through February would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon adult spawning and embryo incubation. Changes in water temperature that would occur under the Proposed Action during the December through June period would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon juvenile rearing and smolt emigration.

Overall, the potential changes in water temperature in the lower American River under the Proposed Action, relative to the No Action condition, would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon. Therefore, impacts on fall-run Chinook salmon in the lower American River with implementation of the Proposed Action, relative to the No Action Alternative would be ***less than significant***.

Steelhead

During the steelhead adult immigration and holding period (November through March), mean weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would remain the same on four occasions, increase slightly on eight occasions, and decrease slightly on three occasions, as shown in Table C-22 in Appendix C. During the adult spawning and embryo incubation period (December through May), mean

weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would remain the same on five occasions, increase slightly on 10 occasions, and decrease slightly on three occasions, as shown in Table C-22 in Appendix C. The largest increase in water temperature would be 0.3 ºF (from 54.9ºF to 55.2ºF) during April with implementation of the Proposed Action, relative to the No Action condition. During the year-round steelhead juvenile rearing period, mean weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would remain the same on seven occasions, increase slightly on 18 occasions, and decrease slightly on 19 occasions, as shown in Table C-22 in Appendix C. The largest increase in water temperature would be 1.8 ºF (from 47.8ºF to 49.6ºF) during November, with implementation of the Proposed Action, relative to the No Action condition. During the steelhead smolt emigration period (January through June), mean weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would remain the same on five occasions, increase slightly on seven occasions, and decrease slightly on six occasions, as shown in Table C-22 in Appendix C. The largest increase in water temperature would be 0.4ºF (from 63.0ºF to 63.4ºF) during June, with implementation of the Proposed Action, relative to the No Action condition (Table C-22 in Appendix C).

Changes in water temperature in the lower American River under the Proposed Action during November through March would not be of sufficient frequency and magnitude to adversely affect steelhead adult immigration and holding. Similarly, changes in water temperature under the Proposed Action during December through May would not be of sufficient frequency and magnitude to adversely affect steelhead adult spawning and embryo incubation. Year-round changes in water temperature that would occur under the Proposed Action would not be of sufficient frequency and magnitude to adversely affect steelhead juvenile rearing. Lastly, changes in water temperature under the Proposed Action during January through June would not be of sufficient frequency and magnitude to adversely affect steelhead smolt emigration.

Overall, the potential changes in water temperature in the lower American River under the Proposed Action, relative to the No Action condition, would not be of sufficient frequency and magnitude to adversely affect steelhead. In addition, the potential changes in flow and water temperature would not be of sufficient frequency and magnitude to adversely affect water quantity and quality conditions and substrate supporting steelhead spawning and egg incubation, freshwater migration corridors for steelhead emigration, rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover for steelhead rearing in the lower American River under the Proposed Action. Therefore, impacts on steelhead in the lower American River with implementation of the Proposed Action, relative to the No Action Alternative would be ***less than significant***.

American Shad

During the American shad adult immigration and spawning period (May and June), mean weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would remain the same on one occasion, increase slightly on three occasions, and decrease slightly on five occasions, as shown in Table C-22 in Appendix C. The largest increase in water temperature would be 0.4°F (from 63.0°F to 63.4°F) during June with implementation of the Proposed Action, relative to the No Action condition. The largest

decrease in water temperature would be 0.3°F (from 60.8°F to 60.5°F) during June with implementation of the Proposed Action, relative to the No Action condition. However, changes in water temperature under the Proposed Action, relative to the No Action condition, would not result in water temperatures outside the reported suitable range (60°F to 70°F) for American shad adult immigration and spawning. Because the amount of time during which water temperatures would be suitable for American shad adult immigration and spawning would not differ substantially between the Proposed Action and the No Action condition, water temperature-related impacts to American shad also are considered to be less than significant. Overall, potential impacts to American shad associated with implementation of the Proposed Action would be ***less than significant***, relative to the No Action Alternative.

Striped Bass

During the striped bass adult spawning, embryo incubation, and initial rearing period (May and June), mean weekly water temperatures at Watt Avenue under the Proposed Action, relative to the No Action condition, would remain the same on one occasion, increase slightly on three occasions, and decrease slightly on five occasions, as shown in Table C-22 in Appendix C. The largest increase in water temperature would be 0.4 °F (from 63.0°F to 63.4°F) during June with implementation of the Proposed Action, relative to the No Action condition. The largest decrease in water temperature would be 0.3 °F (from 60.8°F to 60.5°F) during June with implementation of the Proposed Action, relative to the No Action condition. However, changes in water temperature under the Proposed Action, relative to the No Action condition, would not result in water temperatures outside the reported suitable range (59°F to 68°F) for striped bass adult spawning, embryo incubation, and initial rearing. Because the amount of time during which water temperatures would be suitable for striped bass adult spawning, embryo incubation, and initial rearing would not differ substantially between the Proposed Action and the No Action condition, water temperature-related impacts to striped bass also are considered to be less than significant. Overall, potential impacts to striped bass associated with implementation of the Proposed Action would be ***less than significant***, relative to the No Action Alternative.

No Action Alternative

No change in hydrology or operations would occur under the No Action Alternative, therefore there would be no anticipated adverse impacts on fisheries or aquatic resources within the action area, relative to the existing condition.

4.4.2 Long-Term Warren Act Service Area Impacts

The following analysis addresses potential impacts on fall-run Chinook salmon and steelhead within the long-term WA service area with implementation of the Proposed Action, relative to the No Action condition.

Adverse changes to riparian and instream habitat suitable for spawning and rearing could adversely affect fall-run Chinook salmon and steelhead in Dry Creek, where these species have been known or reported to occur. Such adverse alterations in riparian habitat, if significant, also may affect other streams, while not known to currently support these species, could support expansion of these species' range in the future. In addition, degraded water quality in area streams and creeks resulting from point and non-point source urban/stormwater runoff also could be detrimental to fall-run Chinook salmon and steelhead in Dry Creek or other local streams.

No changes in land use or construction related activities are associated with the Proposed Action, therefore, no potential change in the quality or quality of riparian habitat is anticipated within the long-term WA service area. Disturbance of streamside habitat resulting from future construction activities would be subject to the requirements of CDFG (through a Streambed Alteration Agreement), the Corps, and USFWS (through federal ESA requirements).

Future planned development of undeveloped areas within the long-term WA service area could increase erosion, sedimentation, and urban run-off in local streams. However, local ordinances require developers to prepare and implement erosion and urban runoff control measures and to follow existing BMPs to control stream water quality. The County, in addition to having erosion and urban runoff control policies, also advocates the retention of riparian buffer areas. These areas usually are retained through designation of stream floodways as Open Space and permanent dedication for public use. Areas adjacent to Dry Creek are designated as Open Space Preserve within the Dry Creek Parkway Recreational Master Plan, which will ensure no adverse effects to the existing riparian corridor.

Overall, the retention of riparian buffer areas, along with the implementation of erosion, sedimentation, and urban runoff control measures, would effectively reduce the significance of potential impacts on fall-run Chinook salmon and steelhead within the long-term WA service area. Future planned and approved development within the long-term WA service area is not likely to adversely affect fall-run Chinook salmon and steelhead. Moreover, future planned and approved development is not likely to adversely affect any anticipated expansion of the fall-run Chinook salmon and steelhead range, due to protective urban runoff control measures that would be implemented along sensitive channel embankments. Therefore, potential impacts on fisheries and aquatic resources within the long-term WA service area would be ***less than significant*** with implementation of the Proposed Action, relative to the No Action Alternative.

4.4.3 Mitigation Measures

Potential impacts on fisheries and aquatic resources would be less than significant with implementation of the Proposed Action, therefore no mitigation measures are necessary or recommended.

4.5 TERRESTRIAL AND RIPARIAN RESOURCES

Riparian systems provide habitat that is used by numerous species, including special status-species and species of federal, state and local concern. Existing riparian forest and other backwater communities within the upper and lower American rivers could be effected by changes in hydrologic conditions (e.g., instream flows and reservoir storage). Impacts also could occur to terrestrial habitats and wildlife through habitat conversions resulting from future construction projects within the long-term WA service area. The analysis of potential effects on terrestrial and riparian resources associated with implementation of the Proposed Action was based on the following:

- Decreases in instream flow, of sufficient magnitude and duration, to adversely affect the growth, maintenance, and reproductive capability of upper and lower American River riparian vegetation;

- Decreases in end-of-month reservoir surface water elevation (feet/msl), during June through September, of sufficient magnitude and duration to decrease and degrade continuous stands of native vegetation of relatively high to moderate wildlife value; and
- Potential impacts that could result from secondary growth-related development within the long-term WA service area.

4.5.1 Diversion-Related Impacts

Proposed Action

French Meadows Reservoir

With implementation of the Proposed Action, average end-of-month surface water elevation at French Meadows Reservoir during those years of project operation would decrease by approximately one foot, relative to the No Action condition (Table C-3 in Appendix C) during June through September. The maximum projected change in reservoir surface water elevations under the Proposed Action during June through September would be a decrease of six feet during September in critical water years.

French Meadows Reservoir surface water elevation records are available from the USGS Hydrological Data Report for the period extending from 1964 through 2001. The anticipated decreases in surface water elevations (and associated storage) under the Proposed Action would be within the range of normal operations as indicated by the historic surface water elevation records for French Meadows Reservoir (USGS Website 2005b). Although surface water elevation reductions are anticipated under the Proposed Action, these decreases would not adversely affect the vegetation and wildlife at French Meadows Reservoir because the drawdown zone of this reservoir is essentially devoid of vegetation and does not provide valuable plant communities or habitats. In addition, potential changes in surface water elevations under the Proposed Action would not be of substantial magnitude or duration, relative to the No Action condition, to adversely affect vegetation and wildlife at French Meadows Reservoir. Therefore, potential impacts on terrestrial and riparian resources at French Meadows Reservoir would be ***less than significant*** with implementation of the Proposed Action, relative to the No Action Alternative.

Hell Hole Reservoir

With implementation of the Proposed Action, average end-of-month surface water elevation at Hell Hole Reservoir during those years of project operation would decrease by approximately 9 to 12 feet, relative to the No Action condition (Table C-7 in Appendix C) during June through September. The maximum projected change in reservoir surface water elevation under the Proposed Action during June through September would be a decrease of 29 feet during September in critical water years.

Hell Hole Reservoir surface water elevation records are available from the USGS Hydrological Data Report for the period extending from 1965 through 2001. The anticipated decreases in surface water elevations (and associated storage) under the Proposed Action would be within the range of normal operations as indicated by the historic surface water elevation records (USGS Website 2005a). Although surface water elevation reductions are anticipated under the Proposed Action, these decreases would not adversely affect the vegetation and wildlife at Hell Hole Reservoir because the drawdown zone of this reservoir is essentially devoid of vegetation

and does not provide valuable plant communities or habitats. In addition, potential changes in surface water elevations under the Proposed Action would not be of substantial magnitude or duration, relative to the No Action condition, to adversely affect vegetation and wildlife at Hell Hole Reservoir. Therefore, potential impacts on terrestrial and riparian resources at Hell Hole Reservoir would be ***less than significant*** with implementation of the Proposed Action, relative to the No Action Alternative

Middle Fork and North Fork American Rivers

With implementation of the Proposed Action, average flow in the Middle Fork American River below Ralston Afterbay during those years of project operation would decrease by 100 cfs (4 percent) during May, 10 cfs (1 percent) during June, and 34 cfs (4 percent) during September, and would increase by 40 cfs during July and 41 cfs during August (4 percent), relative to the No Action condition (Table C-10 in Appendix C). The maximum projected decrease in flow under the Proposed Action would be 113 cfs (8 percent) during May in below normal water years. The maximum projected increase in flow under the Proposed Action would be 37 cfs (3 to 4 percent) during July and August in above normal water years. There would be no decreases in flow below Ralston Afterbay during critical water years with implementation of the Proposed Action, relative to the No Action condition, and flows during July and August would increase during wet, above normal, below normal, and dry water year types.

Operations of the MFP under existing conditions currently result in highly variable flows on a daily and weekly basis. The MFP is operated to achieve stable power production during weekdays, while weekend flows are increased substantially to provide sufficient flows for recreational activities in the river. It is assumed that releases under the Proposed Action would be managed to maximize power generation and, therefore, would be released during the week. Thus, increases in releases from MFP facilities would increase flows during the week, thereby decreasing the difference between weekday and weekend flow conditions in the Middle Fork American River below Ralston Afterbay.

Although instream flow reductions are anticipated under the Proposed Action, these decreases would not be of substantial magnitude or duration, relative to the No Action condition, to adversely affect Middle Fork and North Fork American River vegetation and wildlife. The magnitude or velocity of flow releases under the Proposed Action would not increase above current peaking levels; therefore, there is no additional risk of potentially disrupting or displacing vegetation or suitable wildlife habitat, relative to the No Action condition. In addition, the relatively short duration (i.e. approximately two to three hours) of increased daily peak flows associated with the Proposed Action would not be expected to adversely affect vegetation or wildlife habitat. No adverse affects to Middle Fork American River vegetation and wildlife are anticipated with implementation of the Proposed Action. Therefore, changes in flow below Ralston Afterbay that could occur under the Proposed Action would result in a ***less than significant*** impact on Middle Fork and North Fork American River terrestrial and riparian resources, relative to the No Action Alternative.

Folsom Reservoir and the Lower American River

With implementation of the Proposed Action, Folsom Reservoir storage and surface water elevations would not change during those years of project operation or during wet, above, normal, below normal, dry, or critical water years (Table C-13 and Table C-14 in Appendix C). As described in Section 5.2 and Section 5.3 of Appendix C, during those months when Folsom

Reservoir inflows would be reduced, Folsom spills would be reduced to compensate for the reduction in inflow, thus maintaining Folsom Reservoir storage and surface water elevations under the Proposed Action, relative to the No Action condition. No changes in release from Folsom Reservoir would occur, except for minor changes in the frequency and magnitude of spill events (Table C-18 and Table C-19 in Appendix C). Therefore, ***no impacts*** on terrestrial and riparian resources are anticipated at Folsom Reservoir or the lower American River with implementation of the Proposed Action, relative to the No Action Alternative.

Bald Eagle

French Meadows Reservoir has supported nesting bald eagles in the past; however, it is not known whether the species still inhabits the area (PCWA 2001). Reservoir drawdown could affect nesting birds by decreasing the distance from the shoreline to the nesting sites. However, reservoir drawdown could also result in fish concentrating in smaller areas of the reservoir and thereby increasing the rate of fish captured by bald eagle. The potential changes in reservoir levels associated with the Proposed Action are not expected to adversely affect the foraging success of bald eagle. Therefore, ***no impacts*** on bald eagle are anticipated with implementation of the Proposed Action, relative to the No Action Alternative

Bank Swallow

As discussed above under Middle Fork and North Fork American Rivers, the magnitude or velocity of MFP flow releases under the Proposed Action would not increase above current peaking levels; therefore, there is no additional risk of potentially disrupting bank swallow habitat, relative to the No Action condition. In addition, the relatively short duration (i.e. approximately two to three hours) of increased daily peak flows associated with the Proposed Action would not be expected to adversely affect bank swallow habitat along the Middle Fork American River. No adverse affects on bank swallow habitat along the Middle Fork American River are anticipated with implementation of the Proposed Action. Therefore, changes in flow below Ralston Afterbay that could occur under the Proposed Action would result in a ***less than significant*** impact on bank swallow associated with the Middle Fork American River, relative to the No Action Alternative

No Action Alternative

No change in hydrology or operations would occur under the No Action Alternative, therefore there would be no anticipated adverse impacts on terrestrial and riparian resources within the action area, relative to the existing condition.

4.5.2 Long-Term Warren Act Service Area Impacts

The following analysis focuses on potential impacts that could result from secondary growth-related development within the long-term WA service area. Implementation of the Proposed Action would result in improved water supply reliability within the long-term WA service area, which would be an *accommodating* factor rather than *growth inducing*. This is because the proposed surface water supply would be an in-lieu replacement of an already existing water supply (i.e., groundwater) and not an additional water supply. Planning for growth and development within the long-term WA service area is projected to occur with or without the availability of the proposed surface water supply.

In areas throughout the long-term WA service area, impacts could occur to terrestrial habitats and wildlife through habitat conversions resulting from factors that include, but are not limited to, increased commercial and residential development, pollution, and human and domestic pet population intrusion. These impacts would be no different under the Proposed Action versus the No Action condition because it is assumed that such growth would occur regardless of the delivery of surface water. Additionally, land uses within the long-term WA service area are governed by existing regional and local planning mechanisms for addressing impacts to important habitats and species. All potential impacts within the long-term WA service area associated with the delivery of surface water under the Proposed Action were evaluated based on the assumption that: (1) growth would continue to occur regardless of water source; and (2) local ordinances and planning tools would function as designed to identify impacts and provide a means to conserve terrestrial and riparian biological resources.

It is also assumed that CDFG, USFWS, and the Corps would participate in and provide full review of proposed project level development activities within the long-term WA service area. These agencies would apply the provisions contained in the CESA, ESA, and Clean Water Act to monitor development projects and assure that all available and practicable means are taken to conserve scarce and valuable terrestrial and riparian resources within the long-term WA service area.

Terrestrial and Riparian Habitat

The areas where PCWA purchased MFP water may be provided under the SSWD long-term WA contract (i.e., the SSWD long-term WA service area) are substantially developed for urban uses and are almost entirely built out (see **Figure 4-1**). The long-term WA service area consists of approximately 35.5 square miles (22,720 acres). An analysis of undeveloped properties within the long-term WA service area (outside of the designated Open Space Preserve within the Dry Creek Parkway Master Plan) indicated that approximately 206.4 acres are currently undeveloped and have no pending development applications. Other undeveloped areas shown on Figure 4-1 (i.e., Barrett Ranch) have been approved for development or have been developed recently.

Although approximately 206.4 undeveloped acres have the potential to be developed with higher-intensity land uses in the future within the long-term WA service area, no changes in land use or construction related activities are associated with the Proposed Action. Therefore, no potential change in the quality or quality of terrestrial or riparian habitat is anticipated within the long-term WA service area under the Proposed Action. Areas adjacent to Dry Creek are designated as Open Space Preserve within the Dry Creek Parkway Recreational Master Plan. The retention of buffer areas along Dry Creek would effectively reduce the significance of potential impacts on riparian habitat within the long-term WA service area. In addition, disturbance of streamside habitat resulting from any future construction activities would be subject to the requirements of CDFG (through a Streambed Alteration Agreement), the Corps, and USFWS (through federal ESA requirements). Potential impacts associated with future development projects would be addressed through an environmental analysis and approval process independent of this EA, if and when future projects are proposed.

Therefore, potential impacts on terrestrial and riparian resources within the long-term WA service area would be ***less than significant*** with implementation of the Proposed Action, relative to the No Action Alternative.

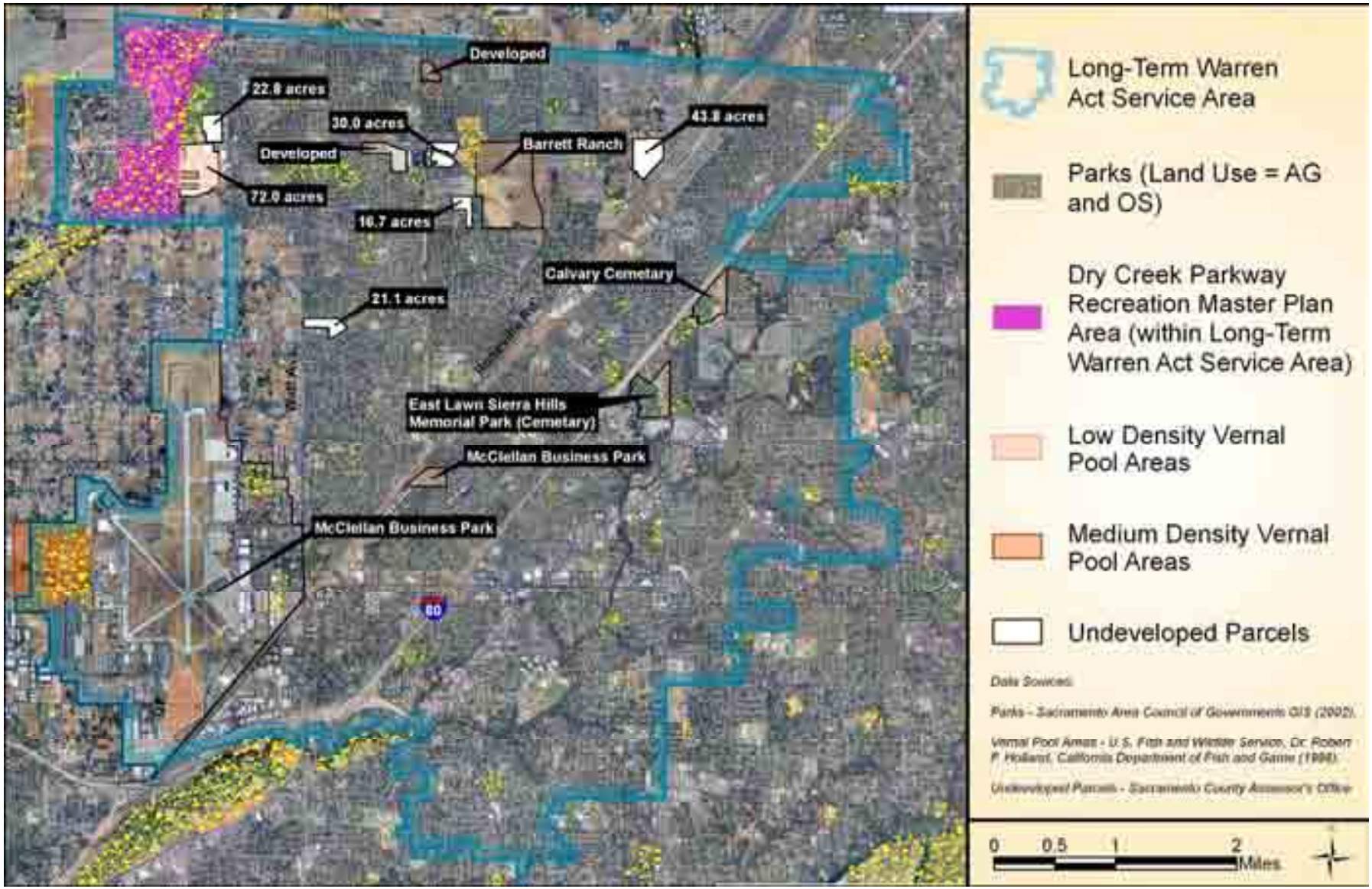

Figure 4-1. Development within the SSWD long-term WA service area.

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Disruption of vernal pool habitat and conversion of vernal pool habitat to other land uses could affect vernal pool fairy shrimp and vernal pool tadpole shrimp. Conversion of vernal pools to urban uses may affect these species' present habitat, as well as the future range expansion of these species. The availability of water to sites where these species presently exist, changes in surface water hydrology, or alteration of critical soil strata resulting from development activities may, in the future, lead to the degradation of vernal pool habitat.

Although specific surveys for vernal pool fairy shrimp and vernal pool tadpole shrimp were not conducted within the long-term WA service area, they occur commonly and have been found in vernal pools within the area and surrounding vicinity. Vernal pool fairy shrimp and vernal pool tadpole shrimp are assumed to be present throughout the vernal pools within the long-term WA service area, which are located within and adjacent to McClellan, as well as adjacent to the Dry Creek Parkway Recreation Plan Area in the northwestern corner of the long-term WA service area (see Figure 4-1). Loss of approximately 72 acres of existing vernal pool habitat due to future planned and approved land conversions likely will affect existing populations of vernal pool fairy shrimp and vernal pool tadpole shrimp, as well as their habitat. However, potential impacts associated with future development projects would be addressed through an environmental analysis and approval process independent of this EA, if and when future projects are proposed.

Vernal pools could be affected by future urban development and changes in land use that are likely to occur within the long-term WA service area. However, no changes in land use, surface water hydrology, or construction related activities are associated with the Proposed Action. Therefore, no potential change in the quality or quality of vernal pools is anticipated within the long-term WA service area. Potential impacts on vernal pool fairy shrimp and vernal pool tadpole shrimp within the long-term WA service area would be ***less than significant***, with implementation of the Proposed Action, relative to the No Action Alternative.

Valley Elderberry Longhorn Beetle

Disruption or loss of elderberry shrubs, the sole habitat of the VELB, would adversely affect this species. Future development within the long-term WA service area could disrupt elderberry shrubs, thereby adversely affecting VELB. Although specific surveys for elderberry shrubs were not conducted within the long-term WA service area, they are commonly found in riparian habitat within the area and surrounding vicinity.

Most of the riparian habitat where elderberry shrubs would likely occur within the long-term WA service area is associated with Dry Creek. Areas adjacent to Dry Creek are designated as Open Space Preserve within the Dry Creek Parkway Recreational Master Plan. Therefore potential impacts on elderberry shrubs associated with future construction activities within or adjacent to the Dry Creek Parkway likely would be avoided to the extent possible and mitigation required by regulatory agencies would ensure no net loss of elderberry shrubs. Even so, elderberry shrubs could be affected by future urban development and changes in land use that are likely to occur within the long-term WA service area. However, no changes in land use or construction related activities are associated with the Proposed Action, therefore, no potential change in the quality or quality of elderberry shrubs is anticipated within the long-term WA service area. Therefore, potential impacts on VELB within the long-term WA service

area would be ***less than significant***, with implementation of the Proposed Action, relative to the No Action Alternative.

4.5.3 Mitigation Measures

With no anticipated impacts to terrestrial and riparian resources as a result of the Proposed Action, no mitigation measures are recommended. Programmatic mitigation measures contained in the Sacramento County General Plan and City of Citrus Heights General Plan EIRs, which address potential impacts to terrestrial and riparian resources, are implemented at the project-level, when and where individual projects are proposed and undergo their separate environmental reviews. In addition, mitigation measures developed for species and their habitats located within the long-term WA service area, as contained in the Sacramento County General Plan and City of Citrus Heights General Plan EIRs, would be implemented to ensure impacts to known terrestrial and riparian resources are minimized to the greatest extent feasible.

4.6 CULTURAL RESOURCES

Criteria for defining significant cultural resources are stipulated in the NHPA and CEQA. The NHPA defines a significant cultural property as one, which is eligible for listing on the NRHP. Eligible properties are those which "(a)…are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) that have yielded, or may be likely to yield, information important in prehistory or history" (36 CFR 60.4).

It is usually necessary to identify, based on previous scientific studies, research issues which are important to an understanding of the regional history or prehistory, and to determine whether a particular cultural resource contains information which may help to address these issues; a resource which does contain such information is considered significant and, therefore, eligible for NHRP. In practice, and under regulation, unevaluated resources are treated as potentially significant.

CEQA requires that *important* cultural resources be protected. The CEQA Guidelines define an important resource as one listed on, or eligible for listing on, the California Register of Historical Resources (PRC Section 5024). Resources that are found to be eligible for the Register "are to be protected from substantial adverse change." Such change is defined in Section 5020.1 as demolition, destruction, relocation, or alteration activities that would impair historical significance; one example would be "remodeling a historic structure in such a way that its distinctive nature is altered" (OPR, 1994).

Adverse effects can occur when prehistoric or historical archaeological sites, structures, or objects listed on, or eligible for listing on the NHRP are subject to any one of the following effects:

- physical destruction of all or part of the property;
- isolation of the property from the property's setting or alteration of the property's setting when that character contributes to the property's qualification for the NHRP;

- introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
- neglect of a property resulting in its deterioration or destruction; and
- transfer, lease, or sale of the property (36 CFR 800.9)

From an aquatic resources perspective, many of the recorded cultural resources within the action area have been historically inundated by earlier projects. A large number of these sites lie submerged beneath the surface of Folsom Reservoir. Studies of reservoir impacts to cultural sites have shown that the most significant impacts result from wave action, which erode the deposit and move artifacts. Equally damaging is the potential for damage associated with cycles of inundation and drawdown, which also cause erosion and movement, in addition to repeated saturation and drying of the deposit (Foster and Bingham 1978; Henn and Sundahl 1986; Lenihan *et al.* 1981).

These same studies suggest that sites that lie permanently submerged, for example, within the deep pool of a reservoir, suffer much less damage than those within the drawdown zone. For sites that already are submerged, continued submergence does not constitute an adverse effect. However, inundation to sites that lie above the present waterline (and that have not been subject to inundation before) potentially would represent an adverse effect.

4.6.1 Diversion-Related Impacts

This section presents an analysis of the potential impacts to cultural resources for the Proposed Action as a result of changes in the hydrological regime of the rivers and reservoirs within the action area. As discussed above, potential impacts to cultural resources within or adjacent to waterbodies and resulting from changing hydrologic regimes may include: (1) physical destruction by waves; (2) bank slumping caused by the formation of a new shoreline; and (3) development of a new zone of wetting-and-drying cycles (enhancing deterioration of some materials supporting cultural resources).

The analysis of potential effects on cultural resources associated with implementation of the Proposed Action within the MFP and Folsom reservoirs was based on an evaluation of the maximum increase and decrease in mean monthly water surface elevations. If the reservoir's water surface elevations rise above the current high water line, previously exposed cultural resources near the shoreline could be inundated. Conversely, lower water surface elevations in the reservoir could expose cultural resources that were previously submerged. Additionally, and perhaps more significantly, if reservoir operations associated with implementation of the Proposed Action would result in a shift in the zone of fluctuation, cultural resources located within the zone also could be potentially affected through increased exposure to erosion, hydrologic sorting caused by wave action, and breakdown of organic matter through repeated saturation and drying.

For the Middle Fork and lower American rivers, the maximum and minimum mean monthly flows, as well as the relative change in average mean monthly flows were compared with implementation of the Proposed Action, relative to the No Action condition.

A definitive stage/discharge relationship has never been developed for the entire range of flows occurring in the lower American River, though limited information does exist for very high (flood) flows. For this reason, it is difficult to quantify precisely the potential for exposure

or inundation of cultural resources along the banks of the lower American River. Generally, however, it is accepted that higher water surface elevations occur under higher flows and lower water elevations occur under lower flows. A comparison of flows under the No Action condition and with implementation of the Proposed Action provides an estimate of the relative changes in river stage that could result.

Proposed Action

French Meadows Reservoir

With implementation of the Proposed Action, average end-of-month surface water elevation at French Meadows Reservoir during those years of project operation would decrease by approximately one foot, relative to the No Action condition (Table C-3 in Appendix C). The maximum projected change in reservoir surface water elevations under the Proposed Action would be a decrease of six feet during September in critical water years.

French Meadows Reservoir surface water elevation records are available from the USGS Hydrological Data Report for the period extending from 1964 through 2001. The anticipated decreases in surface water elevations (and associated storage) under the Proposed Action would be within the range of normal operations as indicated by the historic surface water elevation records for French Meadows Reservoir (USGS Website 2005b). In addition, French Meadows Reservoir would not be drawn down below the minimum water levels required by FERC orders. Under the Proposed Action, potential changes in French Meadows Reservoir surface water elevations would not be of substantial magnitude or duration, relative to the No Action condition, to adversely affect cultural resources. Therefore, ***no impacts*** on cultural resources are anticipated at French Meadows Reservoir with implementation of the Proposed Action, relative to the No Action Alternative.

Hell Hole Reservoir

With implementation of the Proposed Action, average end-of-month surface water elevation at Hell Hole Reservoir during those years of project operation would decrease by approximately 9 to 16 feet, relative to the No Action condition (Table C-7 in Appendix C). The maximum projected change in reservoir surface water elevation under the Proposed Action would be a decrease of 31 feet during critical water years.

Hell Hole Reservoir surface water elevation records are available from the USGS Hydrological Data Report for the period extending from 1965 through 2001. The anticipated decreases in surface water elevations (and associated storage) under the Proposed Action would be within the range of normal operations as indicated by the historic surface water elevation records (USGS Website 2005a). In addition, Hell Hole Reservoir would not be drawn down below the minimum water levels required by FERC orders. Under the Proposed Action, potential changes in Hell Hole Reservoir surface water elevations would not be of substantial magnitude or duration, relative to the No Action condition, to adversely affect cultural resources. Therefore, ***no impacts*** on cultural resources are anticipated at Hell Hole Reservoir with implementation of the Proposed Action, relative to the No Action Alternative.

Middle Fork and North Fork American Rivers

With implementation of the Proposed Action, average flow in the Middle Fork American River below Ralston Afterbay during those years of project operation would decrease by up to 100 cfs

(4 percent) and would increase by up to 41 cfs (4 percent), relative to the No Action condition (Table C-10 in Appendix C). The maximum projected change in flow under the Proposed Action would be a decrease of 113 cfs (8 percent) during below normal water years. The proposed changes in Middle Fork and North Fork American river flows would be within the range of normal MFP operations, therefore, there would be ***no impacts*** on cultural resources in the Middle Fork and North Fork American rivers with implementation of the Proposed Action, relative to the No Action Alternative.

Folsom Reservoir and the Lower American River

With implementation of the Proposed Action, Folsom Reservoir storage and surface water elevations would not change during those years of project operation or during wet, above, normal, below normal, dry, or critical water years (Table C-13 and Table C-14 in Appendix C). As described in Section 5.2 and Section 5.3 of Appendix C, during those months when Folsom Reservoir inflows would be reduced, Folsom spills would be reduced to compensate for the reduction in inflow, thus maintaining Folsom Reservoir storage and surface water elevations under the Proposed Action, relative to the No Action condition. No changes in release from Folsom Reservoir would occur, except for minor changes in the frequency and magnitude of spill events (Table C-18 and Table C-19 in Appendix C). With implementation of the Proposed Action, the frequency of spill events would decrease by one month in April, May and June, and the magnitude of spill events would decrease by up to 130,000 AF (7 percent) during those years of project operation, relative to the No Action condition (Table C-18 and Table C-19 in Appendix C). No increases in the frequency or magnitude of spill events would occur with implementation of the Proposed Action, relative to the No Action condition. Therefore, ***no impacts*** on cultural resources are anticipated within Folsom Reservoir or the lower American River with implementation of the Proposed Action, relative to the No Action Alternative.

No Action Alternative

There would be no change in hydrologic system operations or the resulting hydrological regime under the No Action Alternative, relative to the existing condition. Identical hydrology and operations between the No Action Alternative and existing conditions would result in no change or effect on cultural resources.

4.6.2 Long-Term Warren Act Service Area Impacts

The Proposed Action does not involve any activities that would affect recorded or undisturbed cultural resources within the action area. The Proposed Action would not result in any ground-disturbing activities or any changes to existing water facilities or water supply infrastructure. In addition, no direct changes to land use designations, land use, or proposed facility or construction projects, are anticipated with implementation of the Proposed Action. Therefore ***no impacts*** to cultural resources are expected within the long-term WA service area beyond those previously disclosed in the Sacramento County General Plan and City of Citrus Heights General Plan EIRs.

4.6.3 Mitigation Measures

With no anticipated impacts to cultural resources as a result of the Proposed Action, no mitigation measures are recommended.

4.7 RECREATION

4.7.1 Diversion-Related Impacts

Recreational opportunities associated with waterbodies within the action area could be affected by changes in reservoir levels and river flows with implementation of the Proposed Action. Changes in river flows could result in adverse affects on swimming, tubing, canoeing, kayaking and rafting activities. Reductions in reservoir surface water elevations could result in boat ramps becoming unusable. The analysis of potential effects on recreation opportunities associated with implementation of the Proposed Action within the Middle Fork and lower American rivers was based on potential changes in reservoir levels and river flows of sufficient magnitude and duration to adversely affect recreational opportunities with implementation of the Proposed Action, relative to the No Action condition.

Proposed Action

French Meadows Reservoir

With implementation of the Proposed Action, average end-of-month storage at French Meadows Reservoir during those years of project operation would decrease by up to 1,000 AF (1 percent) during May, July, and August, and would increase by up to 1,000 AF (1 to 2 percent) during September through February, relative to the No Action condition (Table C-2 in Appendix C). The maximum projected decrease in reservoir storage under the Proposed Action would be 5,000 AF (10 percent) in October, November, and December during critical water years, corresponding to a decrease in surface water elevation of 3 to 4 feet (Table C-3 in Appendix C). The minimum water volume storage and associated water surface elevation for boat ramp use at French Meadows Reservoir is 58,700 AF. Under the No Action condition, storage at French Meadows Reservoir would decrease below this value during September through December in a critical water year. In addition to the September through December period, storage at French Meadows also would decrease below this value during August and January in critical water years with implementation of the Proposed Action. Storage at French Meadows Reservoir would not decrease below this value during wet, above normal, below normal, or dry water years. However, peak recreation use is believed to occur during the months of May through August. During this time, storage would remain above the minimum value required for boat ramp use at French Meadows Reservoir with implementation of the Proposed Action, except for during August, when average end-of-month storage would decrease to approximately 56,000 AF. Therefore, the boat ramps would remain usable during the majority of the primary recreation season and there would be no unreasonable adverse effects, as well as no anticipated increases in recreational opportunities, under the Proposed Action. Therefore, the proposed change in reservoir storage with implementation of the Proposed Action would result in a ***less than significant*** impact on recreation opportunities at French Meadows Reservoir, relative to the No Action Alternative.

Hell Hole Reservoir

With implementation of the Proposed Action, average end-of-month storage at Hell Hole Reservoir during those years of project operation would decrease by up to 11,000 AF (7 percent) during April, relative to the No Action condition (Table C-6 in Appendix C). The maximum projected decrease in reservoir storage under the Proposed Action would be 19,000 AF (29 percent) in December during critical water years, corresponding to a decrease in surface water elevation of 30 feet (Table C-7 in Appendix C). The minimum amount of water volume storage

and associated water surface elevation for boat ramp use is 106,150 AF during the primary recreation season. Under the No Action condition, storage at Hell Hole Reservoir would decrease below this value during July through March in critical water year, during October through March in dry water year, during November through January in below normal water years, and during November and December in wet water years. However, peak recreation use at Hell Hole Reservoir is believed to occur during the months of May through August. During this time, storage would remain above the minimum value required for boat ramp use at Hell Hole Reservoir with implementation of the Proposed Action, except for during May and June, when average end-of-month storage would decrease to approximately 100,000 AF and 94,000 AF, respectively, during critical water years. Storage at Hell Hole Reservoir would not decrease below 106,150 AF during wet, above normal, below normal, or dry water years during the May through August peak recreational period. Therefore, the boat ramps would remain usable during the majority of the primary recreation season in most years and there would be no unreasonable adverse effects, as well as no anticipated increases in recreational opportunities, under the Proposed Action. Therefore, the proposed change in reservoir storage with implementation of the Proposed Action would result in a ***less than significant*** impact on the recreation opportunities at Hell Hole Reservoir, relative to the No Action Alternative.

Middle Fork and North Fork American Rivers

With implementation of the Proposed Action, average flow in the Middle Fork American River below Ralston Afterbay during those years of project operation would decrease by up to 100 cfs (4 percent) during May, 10 cfs (1 percent) during June, and 34 cfs (4 percent) during September, and increase by up to 41 cfs (4 percent) during July and August, relative to the No Action condition (Table C-10 in Appendix C). The maximum projected decrease in flow under the Proposed Action would be 113 cfs (8 percent) in May during below normal water years.

The minimum flow needed for whitewater boating on the Middle Fork American River is approximately 800 cfs, and most whitewater boating occurs in late May into September. Under the No Action condition, flows below Ralston Afterbay would decrease below 800 cfs during May through September in critical water years, during May, August, and September in dry water years, and during September in below normal water years. With implementation of the Proposed Action, flows below Ralston Afterbay would also decrease below this value during the same time periods and water year types. With implementation of the Proposed Action, flows below Ralston Afterbay would decrease by approximately 15 cfs (2 percent) during September in below normal water years, and approximately 12 cfs (2 percent) in May during dry water years. There would be in change in flow below Ralston Afterbay in May through September during critical water years with implementation of the Proposed Action, relative to the No Action condition, however, flows during July and August would increase during wet, above normal, below normal, and dry water year types. There would be no unreasonable adverse effects, as well as no anticipated increases in recreational opportunities, in the Middle Fork and North Fork American rivers with implementation of the Proposed Action. Therefore, proposed changes in flow below Ralston Afterbay with implementation of the Proposed Action would result in a ***less than significant*** impact on Middle Fork and North Fork American rivers recreation opportunities, relative to the No Action Alternative.

Folsom Reservoir

With implementation of the Proposed Action, Folsom Reservoir storage and surface water elevations would not change during those years of project operation or during wet, above,

normal, below normal, dry, or critical water years (Table C-13 and Table C-14 in Appendix C). As described in Section 5.2 and Section 5.3 of Appendix C, during those months when Folsom Reservoir inflows would be reduced, Folsom spills would be reduced to compensate for the reduction in inflow, thus maintaining Folsom Reservoir storage and surface water elevations under the Proposed Action, relative to the No Action condition. No changes in release from Folsom Reservoir would occur, except for minor changes in the frequency and magnitude of spill events (Table C-18 and Table C-19 in Appendix C). Therefore, ***no impacts*** on recreational opportunities are anticipated at Folsom Reservoir with implementation of the Proposed Action, relative to the No Action Alternative.

Lake Natoma

Under current operating procedures, Lake Natoma serves as a regulating reservoir for Folsom Dam. This function enables releases from Folsom Dam to fluctuate as needed for electrical power or other purposes, while releases from Nimbus Dam to the lower American River can be made to change less abruptly. As a result, the water level of Lake Natoma fluctuates regularly, but within a much smaller range of water surface levels than Folsom Reservoir. Typically, lake levels change only within a range of 4 to 7 feet, creating a relatively stable shoreline and launching ramp conditions for swimming, fishing, and boating.

Under the Proposed Action, Folsom Dam releases would not change or alter the function of Lake Natoma as a regulating reservoir. Consequently, the historical range of water level fluctuations on Lake Natoma would be expected to continue into the future without substantial change. Therefore, there would be ***no impact*** on recreation opportunities on Lake Natoma with implementation of the Proposed Action, relative to the No Action Alternative.

Lower American River

With implementation of the Proposed Action, relative to the No Action condition, no changes in release from Folsom Reservoir would occur, except for minor changes in the frequency and magnitude of spill events (Table C-18 and Table C-19 in Appendix C). Therefore, ***no impacts*** on recreational opportunities are anticipated with the lower American River with implementation of the Proposed Action, relative to the No Action Alternative.

No Action Alternative

Identical hydrology and operations between the No Action Alternative and existing conditions would result in no change in reservoir surface water elevations or river flows. Therefore, implementation of the No Action Alternative would result in no impacts on recreational opportunities within the action area.

4.7.2 Long-Term Warren Act Service Area Impacts

The Sacramento County Department of Parks, Recreation, and Open Space oversees various park and open space resources, which are managed by local recreation and park districts, including the Sacramento County, Rio Linda/Elverta, Arcade, and Citrus Heights Recreation and Parks Departments. These entities are responsible for the development and maintenance of the various recreational facilities and administering the associated levels of recreational activities. The Proposed Action, as a water delivery action, would not affect the ability to develop or maintain existing recreational facilities within the long-term WA service area or the standard for recreational land intensity. Therefore, implementation of the Proposed Action,

relative to the No Action Alternative, would result in ***no impact*** on recreational facilities or the levels of recreational activity within the long-term WA service area, beyond that previously disclosed in the Sacramento County General Plan and City of Citrus Heights General Plan EIRs.

4.7.3 Mitigation Measures

No recreational impacts on French Meadows, Hell Hole, or Folsom reservoirs, the Middle Fork, North Fork, and lower American rivers, or within the long-term WA service area are anticipated as a result of the Proposed Action, therefore, no mitigation measures are necessary or recommended.

5.0 ENDANGERED SPECIES ACT COMPLIANCE

5.1 INTRODUCTION

As discussed in Chapter 1, Introduction, this joint document has multiple purposes. Within the context of complying with the federal ESA, the Proposed Action (i.e., execution of a long-term WA contract and delivery of water pursuant thereto) has the potential to affect Reclamation's obligations under the federal ESA of 1973, as amended (16 U.S.C. §§1531 *et seq*.). Additionally, the analysis of the Proposed Action described herein serves to address EFH considerations for species protected by the MSFCMA. A detailed description of the Proposed Action under consideration is provided in Section 2.1, Proposed Action.

5.1.1 Regulatory Context

With respect to Reclamation's obligations under the federal ESA, this document is intended to serve as the BA pursuant to section 7(c) of the federal ESA (16 U.S.C. §1536(c)) and to 50 C.F.R. Part 402 concerning the potential effects of Reclamation's action on federally listed threatened and endangered species and on species proposed for listing.

The applicable federal regulations state that the purpose of a BA is to:

(a) *…evaluate the potential effects of the action on listed and proposed listed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action* (50 C.F.R. §402.12, 1995).

In turn, 50 C.F.R. § 402.02 (1995) defines "effect of the action" as follows:

> *Effect of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline… Indirect effects are those that are caused by the proposed action and are later in time, but still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger actions for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.*

Based on the above definitions of indirect, interrelated, and interdependent effects, the area of effect for the Proposed Action includes the area in which the water would be delivered and ultimately used (i.e., the long-term WA service area), and would also include those waterbodies potentially affected by the proposed diversion. These latter areas include a portion of the upper American River basin, Folsom Reservoir and Lake Natoma, and the lower American River.

Federally listed, proposed for listing, candidate, and EFH-managed species with the potential to occur within the action area, and those species having designated critical habitat within the action area, include Central Valley steelhead, (*Oncorhynchus mykiss*), spring-run Chinook salmon (*Oncorhynchus tshawytscha)*, fall-run/late fall-run Chinook salmon (*Oncorhynchus tshawytscha*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepiduras packardi*), VELB (*Desmocerus californicus dimorphus),* and bald eagle *(Haliaeetus leucocephalus).*

This BA considers the following major issues for aquatic, terrestrial, and riparian species within the action area:

- The presence of suitable habitat or potentially suitable habitat for each listed, proposed for listing, candidate, or EFH-managed species in the area affected by the Proposed Action (i.e., execution of a long-term WA contract);
- The established level of use or potential for use of the suitable habitat for each species in the area affected by the Proposed Action;
- The presence, and estimated magnitude, of potential disturbances to species or habitat due to the Proposed Action;
- The extent of direct habitat loss due to the Proposed Action;
- The overall level of direct and indirect effects of the Proposed Action on sensitive species; and
- The past measures implemented to mitigate for indirect effects to sensitive species and their habitat.

5.2 ACTION AREA

The action area is defined in 50 CFR 402.14(g)(3) as the immediate area involved in the action and the entire area where effects to listed species extend as a direct and indirect effect of the action. The action area for the Proposed Action includes the area in which the water would be delivered and ultimately used (i.e., the SSWD long-term WA service area), and also includes those waterbodies potentially affected by the proposed diversion. These latter areas include a portion of the upper American River basin (French Meadows and Hell Hole reservoirs, the Middle Fork American River below Ralston Afterbay, and the North Fork American River downstream of the confluence with the Middle Fork), Folsom Reservoir and Lake Natoma, and the lower American River. These areas are identified on Figure 2-1, Action Area (see Chapter 2, Description of Proposed Action and Alternatives).

5.3 CONSULTATION TO DATE

In compliance with the federal ESA, Reclamation and SSWD have been involved in coordination and informal consultation activities with both USFWS and NMFS since 2004. The project team, including representatives from Reclamation, SSWD, and Surface Water Resources, Inc. (SWRI) (consultant for preparation of the environmental document), met with NMFS and USFWS on July 22 2005, where discussions focused on determining the scope of work, identifying listed and proposed species potentially affected by the Proposed Action, as well as developing a suitable approach for assessing the potential effects of the federal action (i.e., Proposed Action) on listed and proposed species and their habitat, as part of the Section 7 consultations required by the federal ESA. Coordination efforts with NMFS also have addressed EFH for species managed under the MSFCMA.

Following initiation of informal consultation by Reclamation, it is anticipated that USFWS and NMFS will prepare BOs or issue letters of concurrence which will describe the agencies' findings concerning whether the Proposed Action would be expected to adversely affect Central Valley steelhead, fall-run/late fall-run Chinook salmon, vernal pool fairy shrimp, vernal pool tadpole shrimp, VELB, and bald eagle, or adversely modify critical habitat or EFH for these species, as well as spring-run Chinook salmon. It is anticipated that the USFWS and NMFS determinations will be incorporated into the Final EA for the SSWD long-term WA contract.

Contact information for the Proposed Action is as follows:

Project Applicant:	U.S. Bureau of Reclamation Central California Area Office
Address:	7794 Folsom Dam Road, Folsom, California 95630-1799
Contact:	Brian Deason (916) 989-7173

5.3.1 Consultation History

Key meetings, deliverables, decisions and other activities related to the evaluation of Proposed Action effects upon federal special-status species within the action area are described below.

- *March 3, 2004*. In compliance with 50 CFR 402.12(e), the project consultant requests a species list from USFWS.
- *March 12, 2004*. The project consultant receives the species list from USFWS used for the Draft BA evaluation.
- *June 10, 2004*. Reclamation, USFWS, and the project consultant meet for technical assistance purposes in support of the ESA consultation process. The project consultant provides an overview of the Proposed Action, and discusses potential effect considerations on federally listed species that could occur as a result of the Proposed Action.
- *June 24, 2004*. USFWS and the project consultant meet for technical assistance purposes in support of the ESA consultation process. The project consultant provides an overview of the Proposed Action, and discusses potential effect considerations on federally listed species that could occur as a result of the Proposed Action.
- *August 4, 2004*. NMFS and the project consultant meet for technical assistance purposes in support of the ESA consultation process. The project consultant provides an overview of the Proposed Action, and discusses potential effect considerations on federally listed anadromous fish species that could occur as a result of the Proposed Action.
- *July 22, 2005*. SWRI, Reclamation, SSWD, USFWS, and NMFS meet for technical assistance purposes in support of the ESA consultation process. SWRI provides an overview of the Proposed Action, and discusses potential effect considerations on federally listed species that could occur as a result of the Proposed Action.
- *August 10, 2005*. SWRI requests and receives updated species lists from USFWS via the USFWS website.
- *August 11, 2005*. SWRI requests a species list from NMFS.
- *September 19, 2005*. SWRI receives a species list from NMFS.

5.4 CURRENT MANAGEMENT DIRECTION AND ONGOING CONSERVATION PROGRAMS AND PLANS

The Proposed Action has been developed against a backdrop of existing and ongoing federal, state, and local efforts intended to protect federally listed and proposed species and other sensitive species of management concern within the action area for the Proposed Project.

Consultation with USFWS and NMFS regarding the potential effects of the Proposed Action is based on the ESA policy for each resource agency, existing BOs, and other guidance documents.

Legal and statutory authorities and obligations, contractual obligations, and management plans influence how the Proposed Action and Reclamation's actions in general operate within the action area. This section elaborates on those authorities, responsibilities, agreements, policies, and obligations.

5.4.1 Legal and Statutory Authorities

Endangered Species Act

The ESA establishes a federal program to conserve, protect and restore threatened and endangered plants and animals, and their habitats. The ESA specifically charges federal agencies with the responsibility of using their authority to conserve threatened and endangered species. All federal agencies must ensure that any action they authorize, fund or carry out is not likely to jeopardize the continued existence of an endangered or threatened species, or result in the destruction of critical habitat for these species, unless the agency has been granted an exemption. Informal consultation with USFWS and NMFS under the ESA has taken place over the course of the environmental review process for the Proposed Action. USFWS and NMFS representatives assisted in defining the scope of analysis for this BA and the EA, and will participate in their review.

Magnuson-Stevens Fishery Conservation and Management Act

The 1996 amendments to the MSFCMA (16 USC 1801 *et seq*.) require the identification of EFH for federally managed fishery species and the implementation of measures to conserve and enhance this habitat. EFH includes specifically identified waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity and covers a species' full life cycle (16 USC 1802(10)). Federal action agencies are required to consult with NMFS on any action authorized, funded, or undertaken that may adversely impact EFH. This consultation process is usually integrated into existing environmental review procedures in accordance with the NEPA or ESA to provide the greatest level of efficiency.

Essential Fish Habitat

Federal agencies must consult with NMFS on all actions that may adversely affect EFH (Section 305(b)(2) of the MSFCMA). EFH only applies to commercial fisheries; therefore, for the Proposed Action addressed within this BA, Chinook salmon is the only listed species within the action area for which EFH must be considered. Steelhead habitat is removed from consideration because there are no commercial fisheries for this species. In the Mid-Pacific Region, the Pacific Fisheries Management Council designates EFH and NMFS approves the designation.

The NMFS Programmatic BO for the CALFED Program identifies EFH as follows:

> *…EFH is defined in the MSFCMA as "…those waters and substrate necessary to fish for spawning, breeding, feeding or growth and maturity…" NMFS regulations further define "waters" to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" to include sediment, hard bottom, structures underlying the waters,*

and associated biological communities; "necessary" to mean habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" to cover a species' full life cycle.

EFH includes all anadromous streams (including some intermittent streams) up to impassible barriers. In the American River Basin, EFH includes the lower American River up to Nimbus Dam. In the Central Valley, EFH also includes accessible waters of the Delta, Sacramento River, and tributaries up to impassable barriers.

The ESA consultation process may be used to satisfy EFH consultation requirements, thus, a separate EFH document is not required for the Proposed Action. Information regarding the potential effects of the Proposed Action that are contained within this BA, and in the EA for the Proposed Action, satisfy the analytical requirements of EFH for Chinook salmon within the action area.

Additional Statutory and Legal Authorities

Additional legal and statutory authorities considered during preparation of this BA include the CVPIA and the Salmon, Steelhead Trout, and Anadromous Fisheries Program Act, which are discussed in detail in Section 3.4.1, Regulatory Setting.

5.4.2 Regional Management Plans

Regional management plans, programs, and other regulatory initiatives relevant to implementation of the Proposed Action including the AFRP, Reclamation and DWR's COA, OCAP, CVP Long-term Water Service Contracts, CALFED Program, EWA, Steelhead Restoration and Management Plan of California, Water Forum's FISH Plan, CDFG's Restoring Central Valley Streams: A Plan for Action, Steelhead Restoration and Management Plan for the American River, and the Lower American River Corridor Management Plan are discussed in detail in Section 3.4.1, Regulatory Setting.

5.4.3 Local Land Use and Management Plans

Local land use and management plans pertaining to this BA, including the Sacramento County General Plan, Dry Creek CRMP, and the City of Citrus Heights General Plan, are discussed in Section 3.5.1, Regulatory Setting.

5.4.4 Reclamation's Ongoing Conservation Initiatives

Reclamation has numerous programs and policies in place designed to ensure that throughout the CVP, listed species and designated critical habitat are protected and, where possible, enhanced. Implementation of these on-going and future programs serves to avoid adverse effects potentially associated with Reclamation's operation of the CVP and DWR's operation of the SWP, including operations associated with or related to the Proposed Action, upon species protected under the federal ESA. The various programs and policies are described below.

Central Valley Project Conservation Program

Reclamation and USFWS are implementing the Central Valley Project Conservation Program (Conservation Program), a long-term, adaptive management-based program designed to address the needs, including habitat needs, of special-status species potentially affected by the operations of the CVP. Reclamation and USFWS expect the long-term implementation of the

Conservation Program to be accomplished through partnerships with various other programs that have the potential to contribute to and share the goals of the Conservation Program, and with substantive public involvement in defining, refining, and implementing this program.

Central Valley Project Improvement Act

Reclamation and USFWS are implementing the provisions of the CVPIA, which, in part, provide for the protection and enhancement of anadromous fish species, waterfowl, and other species not specifically identified in the CVPIA. Actions are underway to benefit winter-run Chinook salmon and steelhead, as well as initiatives to conserve other species such as giant garter snake, vernal pool species, and other riparian species, some which could be adversely affected by the Proposed Action.

Central Valley Project Wildlife Habitat Augmentation Program

Reclamation is implementing a program to protect and enhance wildlife and especially wetlands throughout the area administered by its Mid-Pacific Region. Those projects, which provide benefits to threatened, endangered, and proposed threatened and endangered species, receive priority protection. The various projects underway benefit vernal pool species and riparian species, which could be adversely affected by the Proposed Action.

Central Valley Operations Under Existing Biological Opinions and Agreements

Many CVP operations and maintenance actions initiated by Reclamation have been the subject of previous ESA consultations with USFWS and NMFS. The results of these consultations have been BOs that stand on their own merits, that establish thresholds to ensure both survival and recovery of listed species, and that establish a baseline for the effects considered by the BOs. Reclamation is presently operating the CVP, and DWR is presently operating the SWP, in accordance with several BOs and agreements, which collectively serve to protect threatened and endangered species that may be adversely affected by the Proposed Action. An overview of the BOs and agreements associated with Central Valley CVP/SWP operations includes:

- 1983 agreement between DWR and DFG "Concerning the Operation of the Oroville Division of the SWP for Management of Fish and Wildlife;"
- BO for the Friant water contract renewals (October 15, 1991);
- BO for the operation of the CVP and the SWP (February 12, 1993);
- Winter-run Chinook salmon BO (February 23, 1993 and May 1995 amendment as per the Bay-Delta Accord);
- Delta smelt BO for the OCAP (May 26, 1993);
- Delta smelt BO for Los Vaqueros (September 9, 1993);
- Sacramento splittail conference BO for the OCAP (March 1996);
- Giant garter snake BO for the interim CVP water contracts (December 27, 1994);
- Giant garter snake BO for the re-initiation of interim CVP water contracts (February 23, 1995);
- BO on implementation of the CVPIA and continued operation of the CVP (October 2000);
- BO on interim operations of the CVP and SWP on Central Valley spring-run Chinook salmon and Central Valley steelhead (September 2002);

- NMFS supplemental BO to the 2002 BO on the interim operations of the CVP and SWP on Central Valley spring-run Chinook salmon and Central Valley steelhead (February 2004);
- USFWS Delta smelt BO on the long-term OCAP for the CVP and SWP (July 2004);
- NMFS BO on the long-term OCAP for the CVP and SWP (October 2004).

The USFWS BO on implementation of the CVPIA and continued operation of the CVP (October 2000) identified several ongoing commitments that Reclamation and USFWS would implement that generally include:

- Commitments Associated with Implementation of the CVPIA
  - Anadromous Fisheries Restoration Activities (§ 3406(b)(1))
  - Habitat Restoration Program (§ 3406(b)(1) other)
  - Management of Dedicated Yield (§ 3406(b)(2))
  - Supplemental Water Acquisition Program (§ 3406(b)(3))
- Commitments Associated with Long-term Renewal of CVP Water Service Contracts
- Commitments for Activities Associated with CVP Water and/or Facilities
- Commitments Associated with CVP Conveyance and Storage
- Commitments Associated with Operations and Maintenance Planning
- Commitments Associated with Conservation Programs

Under the USFWS BO on implementation of the CVPIA and continued operation of the CVP (October 2000), specific commitments by Reclamation and USFWS have been made to ensure that all aspects of the CVP and CVPIA, for which either agency has discretionary authority, will be in compliance with the ESA. These are specifically set out at pages 2-72 through 2-74 of the October 2000 UFSWS BO.

Reclamation is committed to operate the CVP consistent with all current operations criteria and applicable BOs, especially those addressing the CVP/SWP OCAP, Los Vaqueros, and the ROD for the CALFED Program. As a result of a number of factors, including new information, CALFED actions, and newly listed species, Reclamation requested initiation of consultation on the OCAP in March 2004 so that CVP operations could be re-evaluated in the context of current conditions.

A BA for the CVP and SWP OCAP was issued by Reclamation on March 22, 2004. On June 30, 2004, Reclamation issued a revised OCAP and associated revised BA. In October 2004, NMFS issued a BO on the effects of the long-term OCAP for the CVP and SWP on federally-listed endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead, threatened southern Oregon/ northern California coast coho salmon, and threatened central California coast steelhead and their habitat. The October 2004 BO superceded all previous BOs regarding the OCAP for the CVP and SWP. CVP terms and conditions from the NMFS October 2004 BO associated with the American River Division include:

- Reclamation shall manage the cold water supply within Folsom Reservoir and make cold water releases from Folsom Reservoir to balance the needs of Central Valley steelhead and fall-run Chinook salmon in the American River downstream of Nimbus Dam.

- Reclamation shall minimize the adverse effects of flow fluctuations associated with Folsom and Nimbus Reservoir operations on Central Valley steelhead spawning, egg incubation, and fry and juvenile rearing within the American River.

In addition, in July 2004, USFWS issued a BO for the coordinated operations of the CVP and SWP and the OCAP on the federally threatened delta smelt. These OCAP BOs address required commitments under the ESA for continued operation of the CVP and SWP.

Due to numerous changed circumstances since the 2004/2005 OCAP consultation, Reclamation has requested re-initiation of Section 7 ESA consultation with both NMFS and USFWS. In a letter to NMFS dated April 2006, and clarified in May 2006, Reclamation requested initiation of early and formal consultation on the effects of long-term CVP and SWP operations on all federally-listed species and critical habitat which may be affected by those operations, to include the newly designated critical habitat for Central Valley steelhead, Central Valley spring-run Chinook salmon, and Central Coast steelhead. Reclamation also requested initiation of conferencing on the effects of the OCAP on the federally-threatened southern DPS of North American green sturgeon, which would convert into a formal and early consultation following the effective date of the final rule designating its status (i.e., July 2006). In addition, in a letter dated July 2006, Reclamation also requested re-initiation of formal consultation on the OCAP from the USFWS. The major reason for this re-initiation was changed circumstances regarding delta smelt populations, particularly related to new and constantly emerging information stemming from the Pelagic Organism Decline (POD) study effort in the Delta. At this time, a date for the completion of these consultations is unknown.

The existing BOs from NMFS and USFWS associated with OCAP operations dated October 2004 and February 2005, respectively, remain in force during the consultation. The Proposed Action includes actions and potential effects on listed species that fall within the operational parameters of these BOs. Reclamation is committed to continue operating the CVP in conformance with existing or new BOs addressing listed species.

5.4.5 Warren Act Contracts

The WA of 1911, as supplemented by the Drought Relief Act of 1991 and section 3408(c) of the CVPIA, authorizes Reclamation to negotiate and execute contracts to use excess capacity in CVP reservoirs for non-CVP water for domestic, municipal, industrial, fish and wildlife, irrigation, and any other beneficial uses, provided such use does not frustrate project purposes or applicable federal requirements. Such activities are generally covered by "WA contracts" which are intended to formalize the terms and conditions, particularly the priority, of the non-federal party's right (in this case, SSWD) to access CVP facilities for the purposes of impounding, storing or conveying the non-federal party's water rights, and to secure appropriate payment to the United States for the use of such facilities. The water to be stored or conveyed is held by the contractor, pursuant to the contractor's or a third party's water right. The execution of such contracts is preceded by the adequate completion of all appropriate environmental documentation and Section 7 consultation, consistent with NEPA and the federal ESA, respectively. Reclamation must assure that no WA type services would be provided if these services would have a significant adverse impact on the ability of Reclamation or USFWS to meet fish and wildlife obligations as specified under the CVPIA.

WA contracts are negotiated at the sole discretion of Reclamation when capacity is available at federal facilities. The exact amount of non-CVP water to be conveyed through WA contracts varies from year to year and cannot be predicted in advance. The use of federal facilities is usually the most efficient means to deliver the contractor's water supply and frequently, although not the case with SSWD, supplements a federal water supply (i.e., CVP water service contract).

5.4.6 Ongoing Lower American River Basin Management Actions and Plans

Water Forum Process and Development of the Flow Management Standard

SSWD is an active participant in the Water Forum process. The Water Forum is a diverse group of water agencies, business groups, agricultural interests, environmentalists, citizen groups, and local governments (stakeholders) that have been working since the fall of 1993 to evaluate future water needs and supplies in the Sacramento area. The Water Forum stakeholders formulated a Water Forum Proposal for the effective long-term management of the region's water resources. The Water Forum Proposal was formulated based on the two coequal objectives of the Water Forum: (1) provide a reliable and safe water supply for the region's economic health and planned development through the year 2030; and (2) preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River. The Water Forum Proposal was refined into a Water Forum Agreement (in the form of a MOU among stakeholder agencies). The Water Forum Agreement contains a purveyor-specific agreement that includes provisions for diversions in drier and driest years. The Water Forum Proposal has seven linked elements, including "*support for an improved pattern of fishery flow releases from Folsom Reservoir*" and "*Lower American River Habitat Management Element.*"

The Proposed Action includes the SSWD's participation in the Water Forum Agreement and financial contribution to the Lower American River HME. The Lower American River HME was developed as part of the Water Forum Agreement to provide mitigation for both river habitat and recreation effects of Water Forum purveyor actions, including SSWD's long-term WA contract. The lower American River HME includes detailed descriptions of all reasonable and feasible projects that could be implemented to avoid and/or offset potential impacts to lower American River fishery and riparian resources as a result of Water Forum actions, including the Proposed Action.

As part of its Purveyor Specific Agreement with the Water Forum, SSWD is committed to financially participate in the Lower American River HME. According to the Water Forum Agreement, property owners in the unincorporated areas of Sacramento County (i.e., within the long-term WA service area) are assessed in their property taxes for countywide water management expenses that could include many of the activities in the Water Forum Habitat Management Program. Sacramento County Water Agency Zone 13 funds will be used to meet the HME obligations for the purveyors serving the unincorporated areas of Sacramento County (Water Forum 2000).

SSWD's Purveyor Specific Agreement with the Water Forum includes a requirement that SSWD continue to work with other interested parties to pursue a project involving a diversion on the Sacramento River, a new water treatment plant, and water conveyance facilities that connect to the Northridge Conveyance Pipeline for use of Sacramento River water within the area served by the Northridge Conveyance Pipeline. This diversion project is not included as part of the

Proposed Action. Further discussion regarding the SSWD's obligations under the Water Forum Agreement is provided in Section 2.1, Proposed Action.

Development of the proposed Water Forum Flow Management Standard (FMS) is a critical component in achieving the Water Forum objectives, as well as implementing the FISH Plan, which constitutes the aquatic habitat management plan for the lower American River. The primary purpose of the proposed FMS is to maximize the annual production and survival of anadromous salmonids, particularly fall-run Chinook salmon and steelhead, in the lower American River, within water availability constraints. With improved habitat conditions for salmonids, the proposed FMS also will benefit other fish species within the lower American River. Development of an improved flow standard will increase the minimum release requirement for the lower American River and establish water temperature standards, in conjunction with establishing a river management process, including a monitoring program, for Folsom Reservoir and lower American River operations. The proposed FMS consists of three separate elements: (1) required flows and water temperatures; (2) river management; and (3) monitoring and evaluation. The Lower American River Flow Management Standard Report currently is being prepared and will include the detailed analyses and associated discussion required to fully support the three elements contained within the proposed FMS. It is anticipated that the Lower American River Flow Management Standard Report will be submitted to the SWRCB in 2005.

5.5 SPECIES ACCOUNTS AND STATUS OF THE SPECIES AND CRITICAL HABITAT

Pursuant to Section 7(c) of the ESA, Reclamation requested that USFWS and NMFS provide information about any species that is listed or proposed for listing as threatened or endangered, including designated or proposed critical habitats, under the federal ESA that may be present in the action area. USFWS and NMFS provided separate lists of special-status species, which may be present in the action area and could potentially be affected by implementation of the Proposed Action. Species lists provided by USFWS and NMFS are presented in Appendix B.

The federally listed, proposed listed, candidate, and EFH-managed species potentially occurring within the action area, including those species having designated or proposed critical habitat, that were identified through species lists provided by USFWS and NMFS are presented in **Table 5-1**. The occurrences of these species within the action area are discussed in Chapter 3, Affected Environment. While Table 5-1 identifies a wide range of potential species present within the action area, detailed review of existing environmental documentation provides further confirmation with which to refine the likelihood of species occurrences.

As discussed previously (see Section 3.4.10, Species Occurrence within the Action Area), delta smelt, green sturgeon, and winter-run Chinook salmon have not been observed and are not likely to occur within the action area. Since completion of Shasta Dam, the Sacramento River, Battle Creek, and Calaveras River are the only habitats where winter-run Chinook have been known to occur (NMFS 1999; USFWS 1987). The only known spawning population for green sturgeon in California occurs in the Sacramento and Klamath rivers, (Moyle 2002, NMFS 2002). CDFG (2002) suggests that the Southern DPS green sturgeon spawn and rear for the first two months between Keswick Dam (RM 302) and Hamilton City. In addition, green and white sturgeon occasionally enter the Feather River system, but intensive sampling in recent years has found no evidence of spawning and there is no data that spawning occurs now or occurred in the historical time frame (Beamesderfer et al. 2004). No current use by sturgeon of Sacramento

River tributaries, other than the Feather River system, has been reported (Beamesderfer et al. 2004, Moyle 2002). Therefore, winter-run Chinook salmon and green sturgeon are not considered further in this BA.

California tiger salamander, California red-legged frog, mountain yellow-legged frog, giant garter snake, and fisher are not likely to occur within the action area due to lack of habitat associated with reservoir storage and rivers and/or intense urbanization within the long-term WA service area (see Section 3.5.7, Species Occurrence within the Action Area). Plant species associated with gabbroic soils (i.e., Stebbin's morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, El Dorado straw, and Layne's butterweed) are not likely to occur due to lack of habitat within the action area. Sacramento Orcutt grass is not likely to occur due to lack of habitat associated with reservoir storage and rivers, and it is not identified within the long-term WA service area or vicinity. These species are not considered further in this BA.

Critical habitat for a threatened or endangered species is defined in Section 3(5)(A) of the ESA as the specific areas occupied by the species, at the time it is listed, on which are found those physical or biological features essential to the conservation of the species, and which may require special management considerations or protection. Further, specific areas outside the geographical area occupied by the species also may be designated as critical habitat, upon a determination that such areas are essential for the conservation of the species. Designated critical habitat for Central Valley steelhead and spring-run Chinook salmon occurs within the action area and may be affected by the Proposed Action.

Described herein are the biological characteristics that are relevant to the assessment of project-related effects for each species included in this BA. Descriptions include life stage periodicity, current range, habitat requirements, and summary of species occurrence in the potentially affected region. Detailed information for each listed species also has been incorporated by reference from previous NMFS and USFWS BOs. In addition, the following sections summarize information about species-specific recovery plans, where available, that have been implemented to assist in the recovery of the special-status species described below.

Table 5-1. Federally listed, proposed listed, candidate, and EFH-managed species potentially occurring within the action area.

Species	Common Name	Federal Status[1]
Fish		
Acipenser medirostris	Green sturgeon[2]	PT
Hypomesus transpacificus	Delta smelt	T
Oncorhynchus mykiss	Central Valley steelhead	T
Oncorhynchus tshawytscha	Spring-run Chinook salmon	T
Oncorhynchus tshawytscha	Fall-run/late fall-run Chinook salmon[3]	EFH
Oncorhynchus tshawytscha	Winter-run Chinook salmon	E
Plants		
Calystegia stebbinsii	Stebbin's morning glory	E
Ceanothus roderickii	Pine Hill ceanothus	E
Fremontodendron californium ssp. decumbens	Pine Hill flannelbush	E
Galium californicum ssp. sierrae	El Dorado straw	E
Senecio layneae	Layne's butterweed (=ragwort)	T
Orcuttia viscida	Sacramento Orcutt grass	E

Table 5-1. Federally listed, proposed listed, candidate, and EFH-managed species potentially occurring within the action area.

Species	Common Name	Federal Status[1]
Invertebrates		
Branchinecta lynchi	Vernal pool fairy shrimp	T
Lepiduras packardi	Vernal pool tadpole shrimp	E
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T
Amphibians		
Ambystoma californiense	California tiger salamander[4]	T
Rana aurora draytonii	California red-legged frog	T
Rana muscosa	Mountain yellow-legged frog	C
Reptiles		
Thamnophis gigas	Giant garter snake	T
Birds		
Haliaeetus leucocephalus	Bald eagle	FPD/T
Mammals		
Martes pennanti	Fisher	C

1 E=Endangered; T=Threatened; PE=Proposed Endangered; PT=Proposed Threatened; C=Candidate FPD/T = Federally proposed for De-listing as Threatened; EFH = EFH-managed fish species
2 The southern population of North American green sturgeon is proposed for listing as threatened effective July 6, 2006.
3 The Central Valley fall-run/late fall-run Chinook salmon is identified as one ESU.
4 California tiger salamander was designated as Proposed Threatened in Central CA on May 23, 2003, and was listed statewide as "threatened" on November 24, 2004.
Source: USFWS and NMFS species lists

5.5.1 Endangered, Threatened, Proposed Endangered, or Proposed Threatened Species

Within the action area, listed species protected under the federal ESA include Central Valley steelhead, vernal pool fairy shrimp, vernal pool tadpole shrimp, VELB, and bald eagle. In addition, the lower 10 miles of the American River has been designated as critical habitat for spring-run Chinook salmon.

Central Valley Steelhead

Listing Status

On March 19, 1998, NMFS listed the California Central Valley steelhead ESU as "threatened" (63 FR 13347). On September 8, 2000, pursuant to a July 10, 2000 (65 FR 42421) rule issued by NMFS under Section 4(d) of the ESA (16 USC 1533(d)), the take restrictions that apply statutorily to endangered species began to apply to steelhead ESU (65 FR 42422, 42475). The California Central Valley steelhead ESU includes all naturally spawned populations of steelhead in the Sacramento and San Joaquin rivers and their tributaries, but excludes steelhead from San Francisco and San Pablo bays and their tributaries (69 FR 33102).

On June 14, 2004, NMFS proposed listing determinations for 27 ESUs of West Coast salmon and O. *mykiss* (including steelhead ESU). In the proposed rule, NMFS concluded that steelhead are not in danger of extinction, but are likely to become endangered within the foreseeable future throughout all or a significant portion of their range and, thus, proposed that steelhead remain listed as threatened under the ESA. Steelhead from the Coleman NFH and Feather River Hatchery steelhead program, as well as resident populations of *O. mykiss* (rainbow trout) below

impassible barriers that co-occur with anadromous populations are included in the California Central Valley *O. mykiss* ESU and, therefore, are included in the proposed listing. Once the proposed *O. mykiss* listings are finalized, absent amendments to the current 4(d) protective regulations, the take of resident rainbow trout would be prohibited (NMFS 2004). However, NMFS also has proposed to amend current 4(d) regulations to exclude rainbow trout and listed hatchery fish marked by a clipped adipose fin from take prohibitions and Section 4(d) protections (NMFS 2004). Following a series of extensions to the public comment period on the proposed listing determinations, the public comment period closed in November 2004 (69 FR 61348). On June 28, 2005 NMFS issued a final listing determination for steelhead, and in the final rule determined that steelhead continue to warrant listing as threatened under the ESA.

Critical Habitat Designation

On February 16, 2000, NMFS designated critical habitat for the California Central Valley steelhead ESU (65 FR 7764). NMFS designated that critical habitat to include: (1) all river reaches accessible to listed steelhead in the Sacramento River and its tributaries in California; (2) all river reaches and estuarine areas of the Delta; (3) all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; (4) all waters of San Pablo Bay westward of the Carquinez Bridge; and (5) all waters of San Francisco Bay (north of the San Francisco-Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (65 FR 7764). Within these areas, essential features of critical habitat include adequate: (1) substrate; (2) water quality; (3) water quantity; (4) water temperature; (5) water velocity; (6) cover/shelter; (7) food; (8) riparian vegetation; (9) space; and (10) safe passage conditions (65 FR 7764). In addition, a wide range of activities may affect these essential habitat features of Central Valley steelhead. These activities include water and land management actions of federal agencies and related or similar actions of other federally regulated projects and lands, including: (1) livestock grazing; (2) hydropower sites; (3) dams; (4) timber sales; (5) road building activities; (6) mining; (7) dredging; and (8) bank stabilization (65 FR 7764).

On April 30, 2002, under a Consent Decree, the United States District Court for the District of Columbia vacated NMFS' designation of critical habitat for the California Central Valley steelhead ESU (Consent Decree, Nat'l Assn. of Home Builders *et al.* v. Evans, (D.D.C. Case No. 1:00-CV-02799 (CKK), dated April 30, 2002).

On November 30, 2004, NMFS proposed new critical habitat designations for seven ESUs of Pacific salmon and steelhead in California, including the California Central Valley steelhead ESU. Unlike the February 2000 designations that included "all accessible river reaches within the current range of the listed species," the November 2004 proposal identified stream reaches where listed salmon and steelhead have actually been observed or where biologists with local area expertise presume them to occur (69 FR 19975). Following an extension of the public comment period on the proposed critical habitat designations, the public comment period closed in March 2005 (70 FR 6394). The final rule for designation of critical habitat for seven ESUs of pacific salmon and steelhead, including Central Valley steelhead, was released on September 2, 2005 (70 FR 170). NMFS designated critical habitat within the action area includes the American River upstream to endpoints in Dry Creek (70 FR 170).

In determining what areas are critical habitat, agency regulations at 50 CFR 424.12(b) require that NMFS must ''consider those physical or biological features that are essential to the conservation of a given species. . .'' The regulations further direct NMFS to ''focus on the

principal biological or physical constituent elements . . . that are essential to the conservation of the species,'' and specify that the ''known primary constituent elements (PCEs) shall be listed with the critical habitat description.'' NMFS biologists developed a list of PCEs that are essential to the species' conservation and are based on the unique life history of salmon and steelhead and their biological needs. The specific PCEs include: 1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development. These features are essential to conservation because without them the species cannot successfully spawn and produce offspring; 2) Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These features are essential to conservation because without them juveniles cannot access and use the areas needed to forage, grow, and develop behaviors (*e.g.,* predator avoidance, competition) that help ensure their survival; and 3) Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival. These features are essential to conservation because without them juveniles cannot use the variety of habitats that allow them to avoid high flows, avoid predators, successfully compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean in a timely manner. Similarly, these features are essential for adults because they allow fish in a non-feeding condition to successfully swim upstream, avoid predators, and reach spawning areas on limited energy stores. The occupied habitat areas designated in the final rule contain PCEs required to support the biological processes for which the species use the habitat.

Background/Life History

Historically, the California Central Valley steelhead ESU was well distributed throughout the Sacramento and San Joaquin river systems; from the upper Sacramento/Pit river systems south to the Kings and possibly Kern River systems in wet years (NMFS 2003; Yoshiyama *et al.* 1996). Because adults need to over-summer in deep pools in mid to high elevation tributaries, summer steelhead populations were probably eliminated with the construction of large-scale dams during the 1940s, 1950s, and 1960s. Current abundance information suggests that steelhead populations have declined drastically from an estimated one to two million spawners before 1850, 40,000 spawners in the 1960s, to 3,628 spawners in the entire Central Valley (68 FR 4433). Today, most wild, indigenous populations of steelhead occur in upper Sacramento River tributaries below the Red Bluff Diversion Dam (including Antelope, Deer, Mill, and Butte creeks) (McEwan and Jackson 1996). Naturally spawning populations also occur in the American, Feather, and Yuba rivers, and possibly the upper Sacramento and Mokelumne rivers, but these populations have had substantial hatchery influence and their ancestry is not clearly known (Busby *et al.* 1996). Steelhead runs in the Feather and American rivers are sustained largely by Feather River and Nimbus (American River) hatcheries (McEwan and Jackson 1996). Steelhead distribution is primarily limited by dams that block access to upstream reaches of main rivers and their tributary streams. NMFS (2003) estimated that more than 95 percent of historic spawning habitat is now inaccessible and reported that wild steelhead populations in the Central Valley ESU area are continuing to decline and are "likely to become endangered" or are "in danger of extinction."

Adult steelhead immigration into Central Valley streams typically begins in September and continues into March (McEwan 2001). Steelhead immigration generally peaks during January and February (Moyle 2002). Spawning usually begins during late December and may extend through March, but can range from November through April (CDFG 1986a). Unlike Chinook salmon, many steelhead do not die after spawning. Those that survive return to the ocean, and may spawn again in future years.

Time of incubation and hatching varies with region, habitat, water temperature, and spawning season (Reclamation and DWR 2003). Juvenile steelhead typically rear for one to two years (and up to four years) in streams before emigrating as "smolts" (juvenile fish that can survive the transition from fresh water to salt water) (Busby *et al.* 1996). In the Sacramento River, juvenile steelhead migrate to the ocean during spring and early summer, with peak migration through the Delta occurring during March and April (Reynolds *et al.* 1993).

Additional information on steelhead life history, species status and population trends can be found in the October 22, 2004 NMFS' BO on the Effects of the Proposed Long-term Operations, Criteria and Plan (OCAP) for the CVP in coordination with operations of the SWP on Federally Listed Endangered Sacramento River Winter-run Chinook Salmon, Threatened Central Valley Spring-run Chinook Salmon, Threatened Central Valley Steelhead, Threatened Southern Oregon/Northern California Coast Coho Salmon, and Threatened Central California Coast Steelhead and their Designated Critical Habitat Pursuant to Section 7 of the ESA.

Recovery Plan Implementation

NMFS has formed a Central Valley Recovery Team to identify recovery requirements and prepare a recovery plan for steelhead. The Battle Creek Salmon and Steelhead Restoration Project has prepared a restoration plan to improve habitat and water flows along Battle Creek (Ward and Kier 1999). CALFED (2000a) recovery criteria will follow the Viable Salmonid Population (VSP) framework (McElhany *et al.* 2000) developed by NMFS.

Spring-Run Chinook Salmon

Listing Status

On September 16, 1999, NMFS listed the Central Valley ESU of spring-run Chinook salmon as a "threatened species" (64 FR 50393). On March 11, 2002, pursuant to a January 9, 2002 rule issued by NMFS under Section 4(d) of the ESA (15 USC 1533(d)), the take restrictions that apply statutorily to endangered species began to apply to the Central Valley ESU of spring-run Chinook salmon (67 FR 1116, 1129).

Critical Habitat Designation

On February 16, 2000, NMFS designated critical habitat for the Central Valley ESU of spring-run Chinook salmon (65 FR 7778). NMFS designated critical habitat to include: 1) all river reaches accessible to listed Chinook salmon in the Sacramento River and its tributaries; 2) all river reaches and estuarine areas of the Delta; 3) all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; 4) all waters of San Pablo Bay westward of the Carquinez Bridge; and 5) all waters of San Francisco Bay (north of the San Francisco-Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (65 FR 7778). On April 30, 2002, under a consent decree, the United States District Court for the District of Columbia vacated NMFS' designation of critical habitat for the Central Valley

ESU of spring-run Chinook salmon (Consent Decree, *Nat'l Assn. Of Home Builders et al. v. Evans*, (D.D.C. Case No. 1:00-CV-02799 (CKK), dated April 30, 2002).

On November 30, 2004, NMFS proposed new critical habitat designations for seven ESUs of Pacific salmon and steelhead in California, including the California Central Valley steelhead ESU. Following an extension of the public comment period on the proposed critical habitat designations, the public comment period closed in March 2005. The final rule for designation of critical habitat for seven ESUs of pacific salmon and steelhead, including Central Valley spring-run Chinook salmon, was released on September 2, 2005 (70 FR 170). NMFS designated critical habitat within the action area includes the American River upstream to endpoints (i.e., near the Watt Avenue bridge).

Background/Life History

Historically, spring-run Chinook salmon were predominate throughout the Central Valley, occupying the upper and middle reaches of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit rivers, with smaller populations in most other tributaries with sufficient habitat for over-summering adults (Stone 1874; Rutter 1904; Clark 1929). Populations of spring-run Chinook salmon were previously assumed to be restricted to accessible reaches in the upper Sacramento River mainstem, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and the Yuba River (CALFED 2000b; CDFG 1998; 218 FR 68725 (2002); 6 FR 1116 (2002); USFWS 1998), and were assumed to no longer exist in the American River due to the existence and operation of Folsom Dam (NMFS 2000). However, spring-run Chinook salmon juveniles have been observed rearing in non-natal tributaries and intermittent streams during winter months (NMFS 2004), and the lower 10 miles of the American River has been designated as critical habitat for spring-run Chinook salmon (see Critical Habitat Designation above).

Central Valley spring-run Chinook salmon adults are estimated to leave the ocean and enter the Sacramento River from March to July (Myers et al. 1998). Spring-run Chinook salmon spawning typically occurs between late-August and early October with a peak in September. Most "yearling" spring-run Chinook salmon move downstream in the first high flows of the winter from November through January (USFWS 1995; CDFG 1998). In the Sacramento River and other tributaries, juveniles may begin migrating downstream almost immediately following emergence from the gravel with emigration occurring from December through March (Moyle et al. 1989; Vogel and Marine 1991).

Natural spawning populations of Central Valley spring-run Chinook salmon are currently restricted to accessible reaches in the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and Yuba River (CDFG 1998; USFWS unpublished data). With the exception of Butte Creek and the Feather River, these populations are believed to be relatively small, ranging from a few fish to several hundred fish.

Recovery Plan Implementation

NMFS has not yet published a proposed recovery plan for the Central Valley spring-run Chinook salmon.

Vernal Pool Fairy Shrimp

Listing Status

Vernal pool fairy shrimp (*Branchinecta lynchi*) was listed as threatened under the Federal ESA on September 19, 1994 (59 FR 48136).

Critical Habitat Designation

On August 6, 2003, USFWS designated critical habitat for 4 vernal pool crustaceans and 11 vernal pool plants, including the vernal pool fairy shrimp (68 FR 46684). Lands in several counties (Sacramento, Butte, Madera, Merced, and Solano) originally proposed as critical habitat (67 FR 59884) were excluded in the final ruling for designation of critical habitat based on economic analysis (68 FR 46766). USFWS reevaluated this economic exclusion in 2005 and concluded that the determination should be upheld (77 FR 11140).

Although vernal pool fairy shrimp critical habitat was proposed in Sacramento County (Units 13 and 14), these areas were excluded from the final designation. These excluded units are south of State Highway 50 and are not near the action area. No other designated critical habitat units for these species are near the action area.

Background/Life History

The vernal pool fairy shrimp is a small aquatic crustacean belonging to the *Anostraca* order, ranging in size from 1 half inch to 1 inch long. The fairy shrimp has an elongate body with no carapace and 11 pairs of swimming legs on the first 11 of its 13 thoracic segments. It swims upside down by beating its legs in continuous wavelike movements. The fairy shrimp is an omnivorous filter feeder, generally feeding on algae, bacteria, protozoa, rotifers, and detritus (59 FR 48136; (Eriksen and Belk 1999; FR 48136 (1994)).

Vernal pool fairy shrimp have been collected from early December to early May. Female fairy shrimp carry their eggs in a ventral brood sac. The eggs are either dropped to the pool bottom, or remain in the brood sac until the female dies and sinks. These resting eggs or cysts are very durable - they withstand heat, cold, and prolonged desiccation. Eggs dry out when the pool evaporates. They remain on the dry pool bed until rains or some other environmental stimuli prompt them to hatch. The eggs may lay dormant for many seasons but as time passes, their viability decreases. Because not all eggs hatch each season, a dry pool may contain several years breeding worth of eggs. Vernal pool crustaceans have adapted to the short and irregular inundation patterns of vernal pools by reproducing quickly and in large numbers. Eggs hatch quickly under appropriate environmental conditions (68 FR 46687). Once the eggs hatch, the fairy shrimp swiftly progress to the adult stage. Average time to maturity is 41 days; however, in warmer pools it can be a little as 18 (Eriksen and Belk 1999).

All species of vernal pool fairy shrimp depend on vernal pools; their life cycle is contingent on seasonal fluctuations in rainfall, timing and duration of precipitation, and water chemistry and quality. The nuances of water chemistry are still unknown for many vernal pool species (Witham *et al.* 1998); however, water chemistry is often cited as one of the most important factors in determining the distribution of fairy and tadpole shrimp (59 FR 48136). Vernal pool fairy shrimp occur in a wide variety of vernal pool habitat conditions. Specific vernal pool characteristics that determine habitat suitability are not well understood. These shrimp have been found in a variety of pool sizes, formed in various substrates. Results of a multiyear, 27-

county study found vernal pool fairy shrimp in vernal pools 79 percent of the time. Man-made or rock-lined depressions made up the rest of their habitat. Occupied habitats varied greatly, including alkali pools, stock ponds, seasonal drainages, and rock outcrops. Depth of the pool habitats also varied, from frequently occupied pools that were small (<2,125 ft^2/<200 m^2) and shallow (mean of 2 in/5cm), to the less occupied large (480,967 ft^2/44,534 m^2) and very deep (48 in/122 cm) pools (68 FR 46687; (Helm 1998)).

The vernal pool fairy shrimp (*Branchinecta lynchi*) is endemic to the Central Valley of California and Oregon and occurs most commonly in association with vernal pool habitats. This species is fairly widespread in range but is not considered abundant in any locale. It is reported to occur in 26 counties in California from Tehama County south to Riverside County. It also has been reported in the Central Coastal Mountains and South Coast Mountains, but is not reported to occur above 800 feet above msl. The vernal pool fairy shrimp has been documented in Sacramento and Placer counties, and as far north as Jackson County, Oregon (68 FR 46687).

Because vernal pool fairy shrimp was only described in 1990, historic distribution of this species is unknown. Its distribution is likely to have coincided with the historic distribution of Central Valley and Southern California vernal pools. Habitat loss in the Central Valley has been significant since the 1970s due to urban development. It has been estimated that between 50 and 85 percent of the habitat that once supported vernal pools has been lost during this time (Witham *et al.* 1998). Prior to urban expansion, wide-scale habitat loss was limited due to preferential conversion of deeper more friable soils for agriculture use. Grazing was commonly the only effect, and in some cases, grazing slowed the encroachment of grasses into the pools, thus favoring shrimp (USFWS 2004a); 68 FR 46683).

Recovery Plan Implementation

The Draft Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon was released for public comment on November 18, 2004 (USFWS 2004a). This Recovery Plan addresses 33 plant and animal vernal pool species, including the vernal pool fairy shrimp and vernal pool tadpole shrimp discussed in this BA.

The overall goals of the draft recovery plan are as follows:

- Achieve self-sustaining populations of each species and protect them in perpetuity
- Delist the Federally listed species
- Ensure the long-term conservation of the 13 species of special concern
- Interim goals of the draft recovery plan are as follows:
- Stabilize and protect populations to prevent further decline of each species
- Conduct research necessary to refine reclassification and recovery criteria
- Reclassify to threatened status those species listed as endangered

Vernal Pool Tadpole Shrimp

Listing Status

Vernal pool tadpole shrimp (*Lepidurus packardi*) was listed as endangered under the Federal ESA on September 19, 1994 (59 FR 48136).

Critical Habitat Designation

On August 6, 2003, USFWS designated critical habitat for 4 vernal pool crustaceans and 11 vernal pool plants, including the vernal pool tadpole shrimp (68 FR 46684). Lands in several counties (Sacramento, Butte, Madera, Merced, and Solano) originally proposed as critical habitat (67 FR 59884) were excluded in the final ruling for designation of critical habitat based on economic analysis (68 FR 46766). USFWS reevaluated this economic exclusion in 2005 and concluded that the determination should be upheld (77 FR 11140).

Proposed critical habitat designations for vernal pool tadpole shrimp (Units 8 and 9) included some areas in Sacramento County (67 FR 59884). These areas were excluded from designated critical habitat (68 FR 46684). These excluded units are south of or near State Highway 50 and are not near the action area. No other designated critical habitat units for these species are near the action area.

Background/Life History

The vernal pool tadpole shrimp is a small aquatic crustacean in the Triopsidae family. Adult vernal pool tadpole shrimp can reach a maximum length of about 3.4 inches. The tadpole shrimp is distinctive in that it is covered almost entirely by a shield-like shell. This species has 30 to 35 pairs of legs, and two tail-like appendages at the back of its shell. The tadpole shrimp is olive or grey in color and may be mottled. Unlike vernal pool fairy shrimp, the tadpole shrimps swim right-side up near the bottom of pools (USFWS 2004a); 68 FR 46683; (Goettle 1997).

Like vernal pool fairy shrimp, the tadpole shrimp hatches and matures quickly and creates a large number of offspring. Unlike most fairy shrimp, the tadpole shrimp can reproduce more than one time per season (68 FR 46683; (Goettle 1997). The tadpole shrimp can reproduce as many and six times per season, laying 32 to 61 eggs each time.

The vernal pool tadpole shrimp has been found in a wide range of vernal pool habitat conditions. They have been found in vernal pools from 2 to 356,253 square meters with water temperatures from 50°F to 84 °F (10°C to 29°C). Little is known about the water quality (pH, temperature, dissolved oxygen, etc.) habitat requirements for tadpole shrimp, however. The vernal pool tadpole shrimp does not appear to be restricted to specific geologic formations or soil types (68 FR 46683).

The historical distribution of vernal pool tadpole shrimp was probably confined to the Central Valley and central coast regions of California. The species currently occurs in the Central Valley and San Francisco Bay Area. The vernal pool tadpole shrimp is not known to be common in any area. Sacramento County, in the Southeastern Sacramento Vernal Pool Region, currently supports the largest concentration of vernal pool tadpole shrimp (68 FR 46683).

Recovery Plan Implementation

Refer to above discussion regarding vernal pool fairy shrimp.

Valley Elderberry Longhorn Beetle

Listing Status

USFWS listed VELB as "threatened" on August 8, 1980 (45 FR 52803). Several factors contributed to the USFWS decision to list VELB as a threatened species under the federal ESA, including: 1) degradation of undisturbed patches of riparian habitat; 2) extensive clearance of riparian forest for fuel, building material and agricultural, as well as urban and suburban development; 3) extensive use of pesticides; and 4) overgrazing.

Critical Habitat Designation

The USFWS has designated the American River Parkway as critical habitat for VELB (USFWS 1996a). This decision was based on recorded findings that the species has a strong presence in elderberry shrubs near backwater ponds along the lower American River. VELB critical habitat is designated within a portion of the City of Sacramento that encompasses an area enclosed on the north by the Route 160 freeway, on the west and southwest by the Western Pacific railroad tracks, and on the east by Commerce Circle and extends southward to the railroad tracks (45 FR 52803). In addition, the *Recovery Plan for the Valley Elderberry Longhorn Beetle* (USFWS 1984) also considers an area along Putah Creek in Solano County and the area west of Nimbus Dam along the American River Parkway in Sacramento County, to be essential VELB habitat because these areas support large numbers of mature elderberry shrubs which show extensive evidence of use by the beetle (USFWS 1996a).

Background/Life History

The VELB's range in California consists of patchy distribution to as high as 3,000 feet msl from Redding south to Bakersfield, and the western Sierra Nevada foothills to eastern Coast Range foothills (USFS Website 2005). VELB are dependent on elderberry shrubs (*Sambucus spp.*) as host plants, which are a common component of the remaining riparian forests of the Central Valley (USFWS 1996a). VELB do not migrate far from their natal plants, so if a shrub is isolated from other occupied elderberry stands, it is unlikely that individuals would migrate to other trees, especially if the distance is greater than one mile (HCP Stakeholders 2003). Use of the plants by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larvae immediately prior to the pupal stage (USFWS Website 2005b). Surveys conducted along the Cosumnes River and in the Folsom Reservoir area indicate that larval galleries can be found in elderberry stems with no evidence of exit holes. The larvae either expire prior to emerging or are not far enough along in the developmental process to have yet constructed an exit hole (USFWS Website 2005b). Larvae appear to be distributed in stems one inch or greater in diameter at ground level (USFWS 1996a).

The life cycle takes one to two years to complete with most of that time spent as larvae living within the stems of the host plant. Adults generally emerge from late March through June, and are relatively short lived. From March to early June, adults reportedly feed on the foliage, and possibly the flowers, of elderberry shrubs until mating begins.

Eggs are laid in May on stems of healthy, unstressed elderberry shrubs greater than one inch in diameter, as measured at the base. VELB larvae excavate passages into the elderberry shrub, where they may remain in larval form for as long as two years before they emerge as adults.

Upon hatching the larvae then begin to tunnel into the tree where they will spend 1 to 2 years eating the interior wood, which is their sole food source.

Recovery Plan Implementation

The USFWS completed a recovery plan for the federally threatened VELB in 1984. The goals of the recovery plan for VELB are …" *to protect the three known localities, survey riparian vegetation along certain Central Valley rivers for remaining VELB colonies and habitats, provide protection to remaining VELB within its suspected historic ranges, and determine the number of sites and populations*." On July 9, 1999, the USFWS issued revised conservation guidelines for VELB. This most recently issued version of the guidelines should be used in developing all actions and habitat restoration plans. The survey and monitoring procedures described in these guidelines are designed to avoid any adverse effects to the VELB, and obviates the need of a permit to survey for VELB or its habitat, or to monitor conservation areas (USFWS 1984). For further description and additional detail of the recovery plan and the new conservation guidelines for VELB in the action area, please refer to *Recovery Plan for the Valley Elderberry Longhorn Beetle* (USFWS 1984) and to the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999a), respectively.

Bald Eagle

Listing Status

The USFWS listed bald eagle as "threatened" on July 12, 1995 (60 FR 36000). The bald eagle historically ranged throughout North America, except extreme northern Alaska and Canada, and central and southern Mexico. On July 6, 1999 (64 FR 36454), the USFWS proposed to remove the bald eagle from the list of endangered and threatened wildlife in the contiguous United States. The USFWS decision that the bald eagle warrants delisting as a threatened species was attributed to species recovery resulting from protection and management actions initiated under the federal ESA and reduction in levels of persistent organochlorine pesticides occurring in the environment (64 FR 36454). The final rule regarding delisting the bald eagle is still pending.

Critical Habitat Designation

No critical habitat is designated for bald eagles.

Background/Life History

The first major decline in the bald eagle population probably began in the mid- to late-1800s. It coincided with declines in numbers of waterfowl and shorebirds and other major prey species. Direct eagle killing also was prevalent, and, coupled with loss of nesting habitat, these factors reduced bald eagle numbers until the 1940s (60 FR 36000). In 1940, the United States Congress passed the Bald and Golden Eagle Protection Act (16 U.S.C. 668). This law provides for the protection of bald eagles and golden eagles by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds (USFWS Website 2005a). In the 17 years since it was listed throughout the 48 contiguous states under the ESA, the bald eagle population clearly has increased in number and expanded in range (64 FR 36454).

Bald eagles typically are found near open water (e.g., reservoirs, lakes, and rivers) and often use these habitats to forage on resident and anadromous fish species. Such areas must have an

adequate food base, perching areas, and nesting sites to support bald eagles. Large, dead trees near open water are used for perching and are an important habitat component (USFWS 1986). During winter, bald eagles often congregate at specific wintering sites that generally are close to open water and that offer good perch trees and night roosts. Bald eagles have been observed at and around Folsom Reservoir during the winter season. However, the Corps *et al*. (2002) reported that no known records exist of bald eagle nest sites around Folsom Reservoir.

While breeding generally occurs from February to July (Zeiner et al. 1990b *in* (USFS Website 2005), it can be initiated as early as January via courtship, pair bonding, and territory establishment (USFS 1992a *in* (USFS Website 2005). The breeding season normally ends in late August when the fledglings are no longer attached to the immediate nest site. However, the breeding season may vary with local conditions. Incubation may begin in late February to mid-March, with the nesting period extending to as late as the end of June. From June through August, the fledglings remain restricted to the nest until they are able to move around within their environment. Bald eagles are susceptible to disturbance by human activity during the breeding season, especially during egg laying and incubation, and such disturbances can lead to nest desertion or disruption of breeding attempts (USFWS 1986 *in* (USFS Website 2005).

Recovery Plan Implementation

In 1986, the USFWS completed a recovery plan for the Pacific region bald eagle. The goal of the recovery plan for the Pacific region is "*…a minimum of 800 nesting pairs with an average reproductive rate of 1.0 fledged young per occupied area, and an average success rate for occupied areas of not less than 65% over a 5 year period necessary for recovery. Attainment of breeding population goal should be met in at least 80% of management zone. Wintering populations should be stable or increasing* (USFWS 1986)." According to the USFWS, numeric delisting goals have been met since 1995. However, the recovery plan goal for population distribution among management zones is not fully achieved for all areas. Nonetheless, the USFWS currently is proposing to remove the bald eagle from the list of endangered and threatened wildlife in the lower 48 states of the United States (60 FR 36000). For further description and additional detail of the recovery plan for bald eagle in the action area, please refer to the *Recovery Plan for the Pacific Bald Eagle* (USFWS 1986).

5.5.2 Candidate Species

Currently there are no candidate species recognized under the federal ESA within the action area.

5.5.3 Essential Fish Habitat-Managed Species

The 1996 reauthorization of the MSFCMA added a provision for federal agencies to consult with NMFS regarding potential effects on EFH (see Section 5.4.1, Legal and Statutory Authorities). Because EFH only applies to commercial fisheries, Chinook salmon (i.e., spring-run and fall-run Chinook salmon) is the only species within the action area for which EFH must be considered. Steelhead is not considered because there are no commercial fisheries for this species. EFH for Chinook salmon includes all anadromous fish-bearing streams (including some intermittent streams) up to impassable barriers. Portions of the action area for the Proposed Action are identified as EFH for spring-run and fall-run Chinook salmon. The species account for spring-run Chinook salmon is included in Section 5.5.1.

Fall-run/Late Fall-run Chinook Salmon

Listing Status

Central Valley fall-run/late fall-run Chinook salmon is a species of recreational and commercial importance under the MSFCMA. Additionally, the fall-run/late fall-run Chinook salmon ESU recently has been removed from the federal list of candidate species, but remains a species of concern under the federal ESA (NMFS Website 2004)[8]. NMFS broadly defines candidate species as those whose status is of concern, but more information is needed before they can be proposed for listing. However, for the purposes of this BA, fall-run/late fall-run Chinook salmon are primarily addressed for EFH considerations.

Identification of Essential Fish Habitat

The Pacific Coast Salmon Plan (PFMC 2003) has designated EFH for the Pacific Coast salmon fishery, which includes those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. In estuaries and marine areas, salmon EFH extends from the shoreline to the 200-mile boundary of the Exclusive Economic Zone offshore of Washington, Oregon, and California north of Point Conception. In fresh water, salmon EFH includes all the streams, lakes, ponds, rivers, wetlands or other bodies of water that have been historically accessible to salmon. Salmon EFH also includes those areas above all artificial barriers, except for certain dams that fish cannot pass. However, activities that occur above impassable dams that are likely to adversely affect Chinook salmon EFH below the dams would be subject to consultation under the MSFCMA. Within the action area, EFH includes the lower American River up to Nimbus Dam and Dry Creek.

Background/Life History

In the Central Valley, fall-run Chinook salmon are the most numerous of the four salmon runs, and consequently, they continue to support commercial and recreational fisheries of significant economic importance. The fall-run currently is the largest Chinook salmon run utilizing the Sacramento River system, and is the primary run of Chinook salmon spawning in the lower American River. The Feather and Yuba rivers also support runs of fall-run Chinook salmon.

Adult fall-run Chinook salmon begin migrating upstream annually in August and September, with immigration continuing through December during most years and through January during some years (Snider and McEwan 1992; Snider and Vyverberg 1995). It also has been reported that fall-run Chinook salmon in the Central Valley immigrate into natal rivers as early as June (Moyle 2002).

[8] On April 15, 2004, NMFS published a notice in the Federal Register acknowledging establishment of a species of concern list, addition of species to the species of concern list, description of factors for identifying species of concern, and revision of the candidate species list. In this notice, NMFS announced the Central Valley Fall and Late Fall-run Chinook Salmon ESU change in status from a candidate species to a species of concern. In 1999, the Central Valley ESU underwent a status review after NMFS received a petition for listing. Pursuant to that review, NMFS found that the species did not warrant listing as threatened or endangered under the ESA, but sufficient concerns remained to justify addition to the candidate species list. Therefore, according to NMFS' April 15, 2004 interpretation of the ESA provisions, the Central Valley ESU now qualifies as a species of concern, rather than a candidate species (69 FR 19975).

The timing of adult Chinook salmon spawning activity is strongly influenced by water temperature. When daily average water temperatures decrease to approximately 60°F (15.6°C), female Chinook salmon begin to construct nests (redds) into which their eggs (simultaneously fertilized by the male) are eventually released. Fertilized eggs are subsequently buried with streambed gravel. In general, the fall-run Chinook salmon spawning and embryo incubation period extends from October through February (Moyle 2002; Vogel and Marine 1991).

Fall-run Chinook salmon fry emergence generally occurs from late-December through March (Moyle 2002). In the Feather River, fall-run Chinook salmon fry emergence has been reported to occur as early as November (Seesholtz *et al.* 2003). In the Sacramento River Basin, fall-run Chinook salmon juvenile emigration occurs from January through July (Vogel and Marine 1991; Yoshiyama *et al.* 1996).

Management Plans

Chinook salmon are managed under the Pacific Coast Salmon Plan. Additionally, measures for recovery of late fall-run Chinook salmon populations are presented in the AFRP, and the *Recovery Plan for Sacramento-San Joaquin Delta Native Fishes* (USFWS 1996b). CALFED and CDFG are working together to identify restoration goals following the VSP framework (McElhany *et al.* 2000), which aims to ensure the long-term viability of Sacramento-San Joaquin fall-run and Sacramento late fall-run Chinook salmon (CALFED 2000b).

5.6 ENVIRONMENTAL BASELINE

The regulations governing ESA consultations define "environmental baseline" as follows (50 CFR 402.02):

> *The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.*

Because continued wheeling of purchased PCWA MFP water supplies through the federal facilities at Folsom Dam and Reservoir is included in the NMFS BO on the Long-term CVP and SWP OCAP (October 2004) and the USFWS BO on the Long-term CVP and SWP OCAP (July 2004), potential hydrologic impacts associated with this action have already undergone Section 7 consultation under the federal ESA. Therefore, the Proposed Action is included in the environmental baseline as defined above.

Part of the Proposed Action evaluation utilized OCAP hydrologic modeling output to assist in the determination of potential effects on designated critical habitat and listed, proposed for listing, candidate, and EFH-managed species. In accordance with the definition provided above, the OCAP hydrologic modeling simulations of all past and present actions include implementation of the CVPIA and long-term operations of the CVP and SWP, which have all completed Section 7 consultation. Therefore, the environmental baseline for the Proposed Action is consistent with the existing condition.

5.7 EFFECT DETERMINATIONS AND CONCLUSIONS

The following discussion provides Reclamation's conclusions and determinations concerning whether the Proposed Action is likely to adversely affect Central Valley steelhead, spring-run Chinook salmon, fall-run/late fall-run Chinook salmon, vernal pool fairy shrimp, vernal pool tadpole shrimp, VELB, bald eagle, EFH for fall-run Chinook salmon, and designated and proposed critical habitat within the action area. The conclusions in this BA are based on the best scientific and commercial data available, and are intended to assist NMFS and USFWS in reaching their own determinations regarding project-related effects to listed species in the context of the formal ESA consultation process.

In their ESA Consultation Handbook, NMFS and USFWS have defined several types of conclusions and determinations that can be reached through ESA consultation with the federal resource agencies. Five possible determinations exist regarding a proposed action's effects on protected species under the ESA (NMFS and USFWS 1998). These determinations are as follows:

- ***No effect*** - "*No effect*" is the appropriate conclusion when it is determined that the proposed action will not affect a listed species or designated critical habitat.

- ***Is not likely to adversely affect*** - "*Is not likely to adversely affect*" is the appropriate finding when effects on ESA protected species are expected to be discountable, insignificant, or completely beneficial. "*Insignificant effects relate to the size of the impact, and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.*"

- ***Is likely to adversely affect*** - "*Is likely to adversely affect*" is the appropriate finding if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant or beneficial. In fact, in the event the overall effect of the proposed action is beneficial to an ESA-protected species, but also is likely to cause some adverse effects, then the proposed action "*is likely to adversely affect*" the listed species. If incidental take is anticipated to occur as a result of the proposed action, an "*is likely to adversely affect*" determination should be made.

- ***Is likely to jeopardize the continued existence of a listed species/result in the destruction or adverse modification of designated critical habitat*** - "*Is likely to jeopardize the continued existence of a listed species result in the destruction or adverse modification of designated critical habitat*" is the appropriate determination when the action agency or the USFWS and/or NMFS identify situations where the proposed action is likely to jeopardize the species or adversely modify critical habitat. Jeopardy occurs when a proposed action is likely to directly or indirectly appreciably reduce the likelihood of both the survival and recovery of a protected species in the wild by reducing their reproduction, numbers, or distribution. Destruction or adverse modification of critical habitat is a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.

- ***Is likely to jeopardize proposed species/adversely modify proposed critical habitat- "****Is likely to jeopardize proposed species/adversely modify proposed critical habitat"* is the appropriate conclusion if the proposed action is likely to jeopardize the continued existence of the proposed species or adversely modify the proposed critical habitat.

The ESA Consultation Handbook identifies six factors that should be examined, as appropriate for the proposed action under consideration, to assess the direct and indirect effects of a proposed action. These factors are: (1) proximity of the proposed action to the species, management units, or designated critical habitat units; (2) geographic areas where the proposed action-induced disturbance occurs; (3) timing of the proposed action in relationship to sensitive periods of a species' lifecycle; (4) the nature of the effects of the proposed action on elements of a species lifecycle, population size or variability, or distribution; or on the primary constituent elements of the critical habitat; (5) duration of the effects (i.e., (a) pulse effect short-term event whose effects are relaxed almost immediately; (b) pulse effect sustained, long-term, or chronic event whose effects are not relaxed; and (c) threshold effect permanent event that sets a new threshold for some feature of a species' environment); and (6) the disturbance frequency of the effects resulting from the Proposed Action, and how it affects a species based on the species recovery rate (NMFS and USFWS 1998).

The factors described above are evaluated, as appropriate, to determine if the Proposed Action would be associated with the overriding consideration of take, which is the main discriminating factor for selecting the appropriate ESA determination. As can be discerned from the definitions of the five possible determinations under ESA (described above), the amount and extent of protected species take determines which conclusion is appropriate for effects associated with a proposed action.

Under the federal ESA, take is defined as "*…to harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct*" (ESA§3[19]). Harass, pursue, hunt, shoot, wound, kill, trap, capture or collect can be classified as actions that would have a direct effect on a species, at the individual level. Conversely, harm, which is a form of take, is further defined to include "*…significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering*" (NMFS and USFWS 1998). Proposed actions that result in adverse changes of constituent elements of critical habitat (e.g., flows and water temperatures) could result in harm and, thus, result in take of a listed species. When determining the amount and extent of take in order to select the appropriate ESA determination associated with the anticipated effects resulting from a proposed action, both the direct effects on a protected species at the individual level, and the effects to the critical habitat constituent elements of that species should be thoroughly evaluated.

The findings for each evaluated component of the Proposed Action are presented below to assist NMFS and USFWS in determining the overall effect of the Proposed Action on listed and proposed fish species, and designated and proposed critical habitat within the Action Area.

This joint environmental document, as discussed, has been prepared to meet the requirements of NEPA and the federal ESA. Impact determinations and supportive discussions provided previously in Chapter 4, Environmental Consequences, as they pertain to designated critical habitat and listed, proposed for listing, candidate, and EFH-managed species are not reiterated

here. For all listed, proposed for listing, candidate, and EFH-managed species and designated critical habitat within the action area potentially affected by the Proposed Action, impact determinations are provided in Section 4.4, Fisheries and Aquatic Resources, and Section 4.5, Terrestrial and Riparian Resources. A summary of the impact conclusions for each federally listed, proposed for listing, candidate, and EFH-managed species and designated critical habitat is provided below.

5.7.1 Direct and Indirect Effects

Direct effects to a listed species or its habitat are caused by the direct or immediate effects of the Proposed Action and occur at the time of the action. Indirect effects are those that are caused by or result from the Proposed Action, are later in time, and are reasonably certain to occur (USFWS *et al.* 2001).

Species within the Action Area:

- Central Valley steelhead (*Oncorhynchus mykiss*)
- Fall-run/late fall-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Vernal pool fairy shrimp (*Branchinecta lynchi*)
- Vernal pool tadpole shrimp (*Lepiduras packardi*)
- Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
- Bald eagle (*Haliaeetus leucocephalus)*

Proposed Critical Habitat within the Action Area:

- Central Valley steelhead (*Oncorhynchus mykiss*)
- Spring-run Chinook salmon (*Oncorhynchus tshawytscha*)

EFH within the Action Area:

- Chinook salmon (*Oncorhynchus tshawytscha*)

Implementation of the Proposed Action ***is not likely to adversely affect*** the above federally listed, proposed for listing, candidate, and EFH-managed species known to occur within the action area. In addition, the Proposed Action ***is not likely to adversely affect*** critical habitat for Central Valley steelhead and spring-run Chinook salmon, or EFH for Chinook salmon. The Proposed Action would not adversely affect the critical habitat constituent elements or their management in a manner likely to appreciably diminish or preclude the role of that habitat in the recovery of Central Valley steelhead and spring-run Chinook salmon.

5.7.2 Effects of Interrelated Actions

Interrelated actions are those that are part of a larger action and depend on the larger action for their justification (i.e., this action would not occur "but for" a larger action) (USFWS *et al.* 2001). The execution of a WA contract and delivery of water pursuant thereto is not reliant upon a larger action for its implementation. Therefore, would be ***no effects*** of interrelated actions with implementation of the Proposed Action according to the definition provided above. However, the Proposed Action and related components are consistent with the Water Forum Agreement and its coequal objectives of: 1) providing a reliable and safe water supply for the region's economic health and planned development through the year 2030; and 2) preserving the

fishery, wildlife, recreational, and aesthetic values of the lower American River (see Section 5.4.6, Ongoing Lower American River Basin Management Actions and Plans). For further description and detail regarding the Water Forum, refer to the Water Forum Action Plan (Water Forum 2000).

5.7.3 Effects of Interdependent Actions

Interdependent actions are those that have no significant utility apart from the action that is under consideration (i.e., other actions would not occur "but for" this action) (USFWS *et al.* 2001). The exact amount of non-CVP water to be delivered under the SSWD long-term WA contract would vary from year to year and cannot be accurately predicted in advance. The use of federal facilities is usually the most efficient means to deliver the contractor's water supply and frequently, although not the case with the SSWD long-term WA contract, supplements a federal water supply (i.e., CVP water service contract). Therefore, there would be ***no effects*** of interdependent actions on the physical environment as a result of execution of the long-term WA contract and delivery of water pursuant thereto.

5.7.4 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they will be subject to separate consultation pursuant to Section 7 of the ESA (USFWS *et al.* 2001).

This joint environmental document, as discussed above, has been prepared to meet the requirements of NEPA and the federal ESA. Cumulative impact determinations and supportive discussions are provided in Chapter 6, Other Impact Considerations because they pertain to listed, proposed for listing, candidate, and EFH-managed species and designated critical habitat and are not reiterated here. For all listed, proposed for listing, candidate, and EFH-managed fish species and designated critical habitat within the action area potentially affected by the Proposed Action, cumulative impact determinations are provided in Section 6.1, Cumulative Impacts.

6.0 OTHER IMPACT CONSIDERATIONS

NEPA and ESA regulations require specific analysis of cumulative impacts. Reclamation NEPA policies further require that, along with environmental review and assessment activities, consideration be given to short-term uses of the environment versus long-term productivity, irreversible and irretrievable commitment of resources, Indian Trust Assets (ITAs), and Environmental Justice. Chapter 4 (Environmental Consequences) describes the affected environment and potential environmental consequences of the Proposed Action for specific resource categories and impact issues. This chapter addresses broader, indirect, and more qualitative impact issues associated with the above NEPA and ESA requirements. The purpose of this chapter is to describe and evaluate:

- Potential cumulative impacts of the Proposed Action when added to other past, present, and reasonably foreseeable future projects;
- The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity;
- Irreversible and irretrievable commitments of resources associated with the project; and
- Consistency of the project with Reclamation ITA (Department of Interior Secretarial Order 3175) and Environmental Justice (Executive Order 12898) policies.

6.1 CUMULATIVE IMPACTS

Cumulative impacts are defined in CEQ Regulations (40 CFR 1508.7 and 1508.25) as follows:

> *"Cumulative impact" is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."*

For CVP/SWP system-wide hydrological effects, Reclamation, NMFS, USFWS, and other relevant public trust resource agencies have ratified the hydrological modeling framework with which to simulate system-wide potential impacts under a future cumulative condition. Future demand assumptions, along with anticipated CVP/SWP operations and projected regulatory controls, have been agreed to and incorporated into the modeling construct used to analyze potential effects of the long-term CVP and SWP OCAP (i.e., CALSIM II).

Reclamation has completed several environmental documents that definitively illustrate, through CALSIM II modeling, the anticipated future cumulative impacts with operation of the integrated CVP/SWP. Of particular note, a comprehensive listing of past, present, and reasonably foreseeable future actions is included in the Reclamation/Freeport Regional Water Authority (FRWA) Freeport Regional Water Project EIS/EIR, which evaluates all water-related resources included for analysis within this EA/BA for the SSWD long-term WA contract. This current environmental document uses and relies upon the hydrologic modeling output for the future cumulative impacts analysis as contained in the Freeport Regional Water Project EIS/EIR. The Freeport Regional Water Project Draft EIS/EIR was released for public review in July 2003. A final EIS/EIR was certified in April 2004, with the subsequent notice of determination and record of decision filed in April 2004 and January 2005, respectively. The

cumulative analyses included in the Freeport Regional Water Project EIS/EIR is herein incorporated by reference into this current environmental document.

In addition, the cumulative analysis relies upon hydrologic modeling output related to past/historic actions and conditions (i.e., no delivery of PCWA water to SSWD) relative to the Proposed Action included in Appendix C.

6.1.1 Diversion-Related Cumulative Impacts

The following is a summary of the central conclusions of the diversion-related cumulative impact analysis included within the Reclamation/FRWA Freeport Regional Water Project EIS/EIR. Detailed discussions of the modeling results for each of the potentially affected water-related resources are provided in the Freeport Regional Water Project EIS/EIR and are not reiterated in this current environmental document.

The Freeport Regional Water Project EIS/EIR evaluated the potential for future impacts on water-related resources associated with operation of the CVP/SWP within the Sacramento, American, and Mokelumne river basins, as well as the Delta. The cumulative impact analysis included both quantitative and qualitative considerations. The technical approach for conducting the quantitative cumulative impact assessment involved comparing CALSIM II hydrologic model output for the 2020 level of development to the 2001 level of development. The 2020 level of development is representative of long-term future land use patterns and related water demands projected under DWR's Bulletin 160-98. Examples of actions included in the quantitative analysis include Reclamation's OCAP and Trinity River Mainstem Restoration Program, and increased diversions within the American River basin consistent with Sacramento Water Forum projections. In addition to the quantitative analysis of cumulative impacts, the qualitative assessment addressed potential projects included within the CALFED Program.

The Freeport Regional Water Project EIS/EIR identified diversion-related, potentially significant cumulative impacts associated with water supply and hydrology, and aquatic resources. For detailed descriptions of these potentially significant cumulative impacts, please refer to the Reclamation/FRWA Freeport Project EIS/EIR.

The following sections evaluate the potential for the Proposed Action to contribute to the diversion-related, potentially significant cumulative impacts identified in the Freeport Regional Water Project EIS/EIR.

Water Supply and Hydrology

<u>Effects on Delivery Allocations to SWP Customers and CVP Water Service Contractors</u>

Under the cumulative condition, SWP and CVP system-wide north-of-Delta and south-of-Delta water demands and associated deliveries will increase substantially. Increased south-of-Delta deliveries would occur through additional Delta exports and additional reliance on storage reserves in San Luis Reservoir. Increased water demands and deliveries are reflected in reduced carryover storage in northern California reservoirs and reduced Delta outflow. Overall, contract water withdrawals cumulatively have the potential to affect water availability for consumptive uses or instream beneficial uses throughout the Central Valley river system. The potentially significant cumulative effects within the regional area could include the following:

- Changes in Delta outflow;
- Changes in reservoir levels and carryover storage;
- Changes in water quality;
- Impacts on sensitive species: and
- Changes in water supply.

The current use of CVP water supplies is approximately 6.1 million AFA. The CVP's maximum contractual obligation to deliver water is approximately 6.6 million AFA. Therefore, the annual demand for CVP water under existing contracts could increase over time by more than 500,000 AF. Approximately 50 percent of this potential increase in contractual water deliveries by the CVP would be from the American River watershed. This increase in deliveries could decrease the reliability of CVP deliveries to the existing water users. (Freeport Regional Water Authority *et al.* 2003).

With implementation of the Proposed Action, potential changes in French Meadows an Hell Hole reservoir storage and surface water elevations would not be of substantial magnitude or duration, relative to the No Action condition, to adversely affect water supply availability for CVP and SWP customers, and non-CVP American River water users. Re-operation of the CVP/SWP system would not be required with implementation of the Proposed Action due to the availability of surplus flows in the system to maintain water supply deliveries under both Proposed Action and No Action conditions. No changes in storage or release from Folsom Reservoir would occur, except for minor changes in the frequency and magnitude of spill events. Therefore, no adverse impacts on water supply availability are anticipated with implementation of the Proposed Action, relative to the No Action Alternative. The Proposed Action would not contribute, in either frequency or magnitude, to any anticipated changes in long-term SWP customer delivery that could occur under the cumulative condition. In addition, the Proposed Action would not contribute, in either frequency or magnitude, to any changes in delivery to CVP agricultural or M&I contractors, either north or south of the Delta, which could occur under the cumulative condition. Therefore, cumulative incremental impacts on water supply and hydrology associated with delivery allocations to SWP customers and CVP water service contractors would be considered ***less than significant***.

Aquatic Resources

Cumulative impacts are related primarily to ongoing and future (year 2020) CVP and SWP water supply operations. Flow and fish habitat may be affected in the American River and in the Delta. Storage and fish habitat may be affected in Folsom Reservoir. Changes in flow may result in changes to exports from the Delta by the CVP and SWP, potentially affecting fish entrainment levels.

The increase in contractual water deliveries by the CVP from the American River watershed could reduce the water available to meet instream flow and temperature requirements in the lower American River. Flows in the American River would be less under 2020 operations than under 2001 operations. The reduced flow could adversely affect fish habitat in the river. The 2020 simulations assume a greater demand than that assumed under 2001. The effects on flow, therefore, are related to projected growth.

Effects on Folsom Reservoir Fish Species Habitat

Storage in Folsom Reservoir varies substantially from month to month and year to year. The high variability in month-to-month and year-to-year storage provides relatively poor habitat for most fish species, especially sunfish and catfish. Falling surface elevation during the late spring and summer results in desiccation of spawning habitat and relatively barren rearing habitat. Under 2020 operations, storage would be reduced in Folsom Reservoir. Relative to 2001 operations, reduced storage could further degrade habitat conditions for reservoir fishes.

The Proposed Action would not contribute to reductions in reservoir storage or water surface elevations under the cumulative condition. No reductions in long-term average monthly water surface elevation in Folsom Reservoir would be attributable to the Proposed Action. In addition, the Proposed Action would not contribute to any change in the frequency of potential nest-dewatering events in any month of the year. Therefore, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant effects on Folsom Reservoir fish habitat that could occur under the cumulative condition. Cumulative incremental impacts on Folsom Reservoir fisheries would be considered ***less than significant***.

Effects on Lower American River Fall-run Chinook Salmon and Steelhead

► *Flow-Related Impacts to Fall-run Chinook Salmon and Steelhead*

Under the cumulative condition, flows would be reduced compared to flows under 2001 operations. The reduction in flow could adversely affect spawning and rearing habitat for Chinook salmon and steelhead in the lower American River.

The Proposed Action would have no contribution to future lower American River flow reductions at either Nimbus Dam or Watt Avenue. As discussed above for Folsom Reservoir, no changes in release from Folsom Reservoir would occur, with implementation of the Proposed Action except for minor changes in the frequency and magnitude of spill events. Therefore, no flow-related impacts on lower American fisheries and aquatic resources are anticipated with implementation of the Proposed Action, relative to the No Action condition.

► *Water Temperature-Related Impacts to Fall-run Chinook Salmon and Steelhead*

Changes in reservoir storage and river flow potentially affects water temperature in the lower American River. Water temperature in river reaches immediately downstream of the primary reservoirs, including Folsom Reservoir, are the most sensitive to effects of operations.

Water temperature in the lower American River is slightly warmer under 2020 operations than under 2001 operations. The warming of water attributable to 2020 operations is almost always less than 1°F. However, water temperature suitability indices for steelhead and Chinook salmon life stages in the lower American River are less than optimal for many months. Future operations will degrade conditions for most life stages of Chinook salmon and steelhead. Adult Chinook salmon and steelhead are most affected because water temperature conditions are less suitable during the period of life stage occurrence (i.e., late summer and fall) and warming has a greater adverse effect. Warmer water temperature conditions under 2020 operations would have an adverse effect on adult migration, spawning, incubation, rearing, and juvenile migration life stages of Chinook salmon and steelhead in the lower American River.

Under a worst-case water temperature scenario (see Appendix C for further information), the average water temperature would be 0.2ºF colder at Watt Avenue with implementation of the Proposed Action, relative to the average water temperature under the No Action condition (Table C-22 in Appendix C). Average river water temperatures at Watt Avenue would be less than 56°F during each month from December through April. In addition, the Proposed Action would not contribute to additional occurrences of water temperatures exceeding 65°F at Watt Avenue during the months of March through June. Because under a worst-case water temperature scenario the average water temperature would be 0.2ºF colder at Watt Avenue, average water temperatures at Watt Avenue would be less than 56°F during each month from December through April, and there would be no additional occurrences of water temperatures exceeding 65°F during March through June, the changes in water temperature at Watt Avenue attributable to the Proposed Action would not occur with enough frequency to result in significant impacts under the cumulative condition.

► *Summary of the Proposed Action Incremental Contribution to Cumulative Effects on Lower American River Fall-run Chinook Salmon and Steelhead*

The long-term average monthly flow levels under the Proposed Action would remain within the range of flows that provide fall-run Chinook salmon spawning habitat, and no flow reductions would occur. Consequently, the Proposed Action would not contribute to potentially significant impacts on the long-term initial year-class strength of lower American River fall-run Chinook salmon that could occur under the cumulative condition.

The Proposed Action would not contribute to potentially significant flow-related impacts on fall-run Chinook salmon and steelhead juvenile rearing that could occur under the cumulative condition. The changes in water temperature at Watt Avenue attributable to the Proposed Action would not occur with enough frequency to result in significant impacts. Therefore, the Proposed Action would not contribute to potentially significant water temperature-related impacts on fall-run Chinook salmon and steelhead juvenile rearing that could occur under the cumulative condition.

The Proposed Action would not have a cumulatively considerable contribution to potentially significant flow-related impacts on steelhead rearing that could occur under the cumulative condition. The decreases in water temperature at Watt Avenue attributable to Proposed Action would have a beneficial impact to steelhead rearing. Consequently, the Proposed Action would not have a cumulatively considerable contribution to potentially significant water temperature-related impacts on steelhead rearing that could occur under the cumulative condition.

Therefore, cumulative incremental impacts on lower American River fall-run Chinook salmon and steelhead would be ***less than significant***.

Effects on Delta Fish Populations

► *Exports increase slightly from November through July under 2020 operations. Although increased exports could increase entrainment, the slight increase in exports would have minimal effect on entrainment of Delta fishes.*

The Proposed Action would not result in changes to Delta inflows. Therefore, there would be no decreases in long-term average Delta outflow attributable to the Proposed Action. Thus, the Proposed Action would not have a cumulatively considerable contribution to the potentially significant reductions in Delta outflow that could occur under the cumulative condition. In addition, the Proposed Action would not contribute to shifts in the long-term average position of X2 during the February through June period that could occur under the cumulative condition. Because the Proposed Action would not result in changes to Delta inflows, and would not contribute to shifts in the long-term average position of X2 during the February through June period that could occur under the cumulative condition, the Proposed Action would have no cumulatively considerable contribution to potentially significant impacts on Delta fishery resources that could occur under the cumulative condition. Therefore, cumulative incremental impacts on Delta fish populations would be considered ***less than significant***.

Effects on Hydrology Related to Past/Historic Conditions and Actions

In addition to the evaluation of the potential for the Proposed Action to contribute to the diversion-related, potentially significant cumulative impacts identified in the Freeport Regional Water Project EIS/EIR discussed above, a modeling scenario was developed at Reclamation's request to illustrate past/historic actions and conditions (i.e., no delivery of PCWA water to SSWD) relative to the Proposed Action. Under the No Water Delivery scenario, no conveyance of PCWA MFP water through Folsom Reservoir and the federal facilities at Folsom Dam to the SSWD long-term WA service area would occur. Development of the No Water Delivery scenario allowed a sensitivity analysis to be performed through a comparison of the differences between the "Proposed Action vs. No Action" modeling scenario and the "Proposed Action vs. No Water Delivery" modeling scenario. The results of the sensitivity analysis are included in Appendix C, Hydrologic Modeling Analysis, and illustrate the relatively minor differences in MFP and Folsom reservoir storage and elevations, Middle Fork American River flows, Folsom Reservoir inflow, the frequency and magnitude of Folsom Reservoir spills, and lower American River water temperatures at Watt Avenue related to past/historic conditions and actions. The results of the sensitivity analysis indicate that past/historic hydrologic conditions and actions would have no cumulatively considerable contribution to potentially significant impacts that could occur under the cumulative condition. Therefore, cumulative incremental impacts related to past/historic hydrologic conditions would be considered ***less than significant***.

6.1.2 Long-Term Warren Act Service Area Cumulative Impacts

Future cumulative impacts to various resources, activities, services, and the quality of life within the long-term WA service area have been addressed in a variety of previous County and City planning and environmental documents. The Sacramento County General Plan, specific plans, and various project-specific environmental documents have all addressed the potential future cumulative impacts to resources within the long-term WA service area.

The areas where PCWA purchased MFP water may be provided under the SSWD long-term WA contract (i.e., the SSWD long-term WA service area) are substantially developed for urban uses and are almost entirely built out. Based on the 1991 Northridge Water Master Plan (NWD 1991), the former Northridge service area would be essentially fully developed by 2010. In addition, the Proposed Action would provide supplemental water for existing and near future demands that could be met through continued groundwater extraction. Therefore, there would be no growth-inducing impacts associated with implementation of the Proposed Action.

Sacramento County and the City of Citrus Heights have addressed potential project-specific and cumulative service area impacts upon environmental resources through the adoption and implementation of mitigation measures to minimize or avoid significant effects. The Proposed Action, through delivery of a reliable surface water supply within the long-term WA service area, would not directly cause the impacts related to development of urban uses within the long-term WA service area identified in these earlier analyses. The overall contribution of the Proposed Action to previously identified cumulative impacts is considered ***less than significant*** because no new impacts would occur with implementation of the Proposed Action beyond those previously disclosed in prior environmental documents.

6.2 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Reclamation's NEPA policies require that during preparation of an EA, both short- and long-term impacts should be addressed (Section 102(2)(c)(iv) and 40 CFR 1502.16). Short-term refers to the time period that includes the immediate implementation of the project and long-term refers to the time period that includes the operation life of the project facilities and beyond. This discussion addresses how the implementation of the Proposed Action would affect the long-term productivity of the natural and human environment.

Implementation of the Proposed Action would increase the reliability and availability of water supplies within the long-term WA service area. This increase in reliability and productivity would help the area meet current and projected demands, thus supporting the economic viability of the service area. In addition, implementation of the long-term WA contract would fulfill the growth and infill projections as projected in the Sacramento County General Plan. No short-term impacts would occur due to implementation of the Proposed Action.

6.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

As stated in Reclamation's NEPA Handbook:

> *"Irreversible commitments are decisions affecting renewable resources such as soils, wetlands, and waterfowl habitat. Such decisions are considered irreversible because their implementation could affect a resource that has deteriorated to the point that renewal can occur only over a long period of time or at great expense or because they would cause the resource to be destroyed or removed."*

No irreversible commitments of resources associated with implementation of the Proposed Action have been identified.

The handbook states further:

> *"Irretrievable commitment of natural resources means loss of production or use of resources as a result of a decision. It represents opportunities foregone for the period of time that a resource cannot be used."*

Irretrievable commitments of resources that would result from implementation of the Proposed Action include:

- Energy needed for operation and maintenance of facilities.

6.4 CONFLICTS WITH U.S. BUREAU OF RECLAMATION POLICIES

In addition to NEPA compliance, Reclamation must comply with Department of Interior directives such as protection of ITAs and Executive Orders, such as Environmental Justice. Compliance with these directives is discussed below.

6.4.1 Indian Trust Assets

ITAs are legal interests in property held in trust for Indian tribes or individuals by the United States. It is Reclamation's policy to protect ITAs from adverse impacts resulting from its programs and activities. There have been no ITAs identified within the action area, therefore no adverse impacts to ITAs are anticipated as a result of the Proposed Action. For a more detailed discussion of ITAs, refer to Section 7.6, Indian Trust Assets Policy.

6.4.2 Environmental Justice

Executive Order 12898, Environmental Justice, requires that review of proposed federal actions analyze any disproportionately high and adverse environmental or human health effects on minority and low-income communities. No disproportionately high or adverse environmental or human health impacts on minority or low-income communities have been identified for the Proposed Action. For a more detailed discussion of Executive Order 12898, refer to Section 7.9.5, Other Federal Statutes and Regulations of Relevance.

7.0 STATUTES AND REGULATIONS

7.1 NATIONAL ENVIRONMENTAL POLICY ACT

NEPA requires federal agencies to examine the impact of any major federal actions affecting the environment (42 U.S.C. § 102). Federal actions include projects undertaken or funded by the agencies as well as proposals over which the agency has approval powers. Reclamation is the lead federal agency under NEPA for the Proposed Action. Additional agencies that could use this document to satisfy NEPA requirements include the Corps, USFWS, and other agencies. This EA has been prepared in compliance with NEPA.

7.2 FEDERAL ENDANGERED SPECIES ACT OF 1973, AS AMENDED

As part of this project, Reclamation requested and received from USFWS a list of federally designated endangered, threatened, and proposed listed species. The list was initially received in March 2004 and was updated via the USFWS Quad Species List website on August 10, 2005. In addition, a species list was requested from NMFS on August 11, 2005. Endangered, threatened, proposed listed, and candidate species located within the action area and potential impacts to those species are discussed in Section 4.4, Fisheries and Aquatic Resources, and Section 4.5, Terrestrial and Riparian Resources. This document also serves as the BA, which must be prepared by Reclamation pursuant to section 7(c) of the federal ESA (16 U.S.C. §1536(c)) and to 50 C.F.R. Part 402 (see Chapter 5, Endangered Species Act Compliance). Reclamation and SSWD have been involved in coordination and informal consultations regarding the Proposed Action with both USFWS and NMFS since 2004.

Following USFWS and NMFS review of the Draft EA and FONSI, Reclamation and SSWD anticipate that USFWS and NMFS will prepare a letter of concurrence finding that the Proposed Action will not adversely affect protected species under their respective jurisdictions within the action area. Alternatively, USFWS and NMFS may issue a BO pursuant to section 7(b) of the federal ESA (16 U.S.C. §1536(b)), setting forth their opinions as to whether the action proposed by Reclamation is likely to jeopardize the continued existence of any federal listed species or result in the destruction or modification of the designated critical habitat of such species.

7.3 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The 1996 amendments to the MSFCMA (16 USC 1801 *et seq*.) require the identification of EFH for federally managed fishery species and the implementation of measures to conserve and enhance this habitat. EFH includes specifically identified waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity and covers a species' full life cycle (16 USC 1802(10)). Federal action agencies are required to consult with NMFS on any action authorized, funded, or undertaken that may adversely impact EFH. This consultation process is usually integrated into existing environmental review procedures in accordance with the NEPA or ESA to provide the greatest level of efficiency. Coordination efforts with NMFS have addressed EFH for species managed under the MSFCMA. EFH considerations are addressed as part of the BA completed for the Proposed Action (see Chapter 5, Endangered Species Act Compliance).

7.4 FISH AND WILDLIFE COORDINATION ACT

The Fish and Wildlife Coordination Act (FWCA) gives the U.S. Secretary of Interior the authority to provide assistance to federal, state, public, or private agencies in developing,

protecting, rearing, or stocking all wildlife, wildlife resources and their habitats (16 U.S.C. § 661). Under the FWCA, whenever waters of any stream or other water body are proposed to be impounded, diverted, or otherwise modified by any public or private agency under federal permit, that agency must consult with the USFWS and, in California, the CDFG. Because the Proposed Action would not modify storage in Folsom Reservoir, Reclamation has determined that a Fish and Wildlife Coordination Act Report (CAR) is not required for the Proposed Action.

7.5 NATIONAL HISTORIC PRESERVATION ACT

The NHPA requires the federal government to list significant historic resources in the NRHP. Federal agencies must consult the National Register when planning to undertake or grant approval for a project. Prior to issuing any license or implementing a project, the federal agency shall consider the effects of the project or license on any historical buildings, sites, structures, or objects that are included in, or eligible for inclusion in, the National Register (16 U.S.C. § 470, f). The evaluations of cultural resources as part of this EA document comply with the NHPA as it applies to the Proposed Action and alternatives. Relevant and available documentation for the Area of Potential Affect (APE) are summarized in Section 3.6, Cultural Resources. Other than a ditch which runs within the drawdown zone of Folsom Lake that has been determined eligible for inclusion in the National Register, no other archaeological sites within Folsom Reservoir have been declared eligible or listed in the National Register.

7.6 INDIAN TRUST ASSETS POLICY

ITAs are legal interest in property held in trust for Indian tribes or individuals by the United States. Trust Assets can be lands, minerals, hunting and fishing rights, and water rights. Reclamation's ITA policy and NEPA implementing procedures provide for the protection of ITAs from adverse impacts resulting from federal programs and activities. Potential impacts on ITAs resulting from implementation of the Proposed Action have been reviewed and no adverse affects would occur to ITAs as a result of the Proposed Action.

7.7 NATIONAL WILD AND SCENIC RIVERS ACT

The Wild and Scenic Rivers Act of 1968 (P.L.-542, 16 U.S.C. 1271-1287) establishes the policy that certain rivers and their immediate environments which possess outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values will be preserved and protected. In January 1981, the Department of the Interior designated the lower American River from Nimbus Dam to its confluence with the Sacramento River as wild and scenic for both fishery and recreation values.

Section 10 of this act requires that each component of the Wild and Scenic river system be administered in such a manner as to protect and enhance the values for which the river was designated. Under this act, federal agencies that have discretionary decision-making authority (i.e., permitting authority) must review the proposed project in relation to Section 7 and Section 10 of the act to determine if the proposed project would affect the values of the Wild and Scenic river. If approved, Reclamation would ensure that the Proposed Action would not adversely affect the fisheries and recreation values of the lower American River.

7.8 FARMLAND PROTECTION POLICY ACT, P.L. 97-98

The Farmland Protection Policy Act is administered by the Natural Resources Conservation Service. This act requires a federal agency to consider the effects of its actions and programs on the Nation's farmlands. The Proposed Action would not result in any loss of farmland.

7.9 OTHER FEDERAL STATUTES AND REGULATIONS OF RELEVANCE

Presented below is a preliminary review of federal permits and requirements that may be associated with the implementation of the proposed long-term WA contract.

7.9.1 Section 10 of the Rivers and Harbors Act

Under Section 10 of the Rivers and Harbors Act, the Corps regulates the construction of structures or activities that could interfere with navigation. A permit is needed to construct or modify structures such as water intake systems in navigable waters as well as to perform activities such as dredging, stream channelization, excavation, and filling (33 USC § 403).

7.9.2 Section 401 of the Clean Water Act

Section 401 of the Clean Water Act (CWA) (33 USC § 1311) prohibits the discharge of any pollutants into navigable waters, except as allowed by permit issued under sections 402 and 404 of the CWA (33 USC § 1342 and 1344). If new structures (e.g., treatment plants) are proposed, that would discharge effluent into navigable waters, relevant permits under the CWA would be required for the project applicant(s). Section 401 requires any applicant for an individual Corps dredge and fill discharge permit to first obtain certification from the state that the activity associated with dredging or filling will comply with applicable state effluent and water quality standards. This certification must be approved or waived prior to the issuance of a permit for dredging and filling.

7.9.3 Section 404 of the Clean Water Act

Section 404 of the CWA authorizes the Corps to issue permits to regulate the discharge of "dredged or fill materials into waters of the United States" (33 USC § 1344). No activities such as dredging or filling of wetlands or surface waters would be required for implementation of the Proposed Action, therefore permits obtained in compliance with CWA section 404 are not required.

7.9.4 Executive Order 11990 (Protection of Wetlands)

Executive Order 11990 on Protection of Wetlands calls for each federal agency, in carrying out its ordinary responsibilities, to take actions to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Reclamation will not be undertaking or assisting in any new construction in wetlands.

7.9.5 Executive Order 12898 (Environmental Justice)

Executive Order 12898 on Environmental Justice requires that environmental analyses of proposed federal actions address any disproportionately high and adverse human health or environmental effects on minority and low–income communities. Reclamation's responsibility under this order applies equally to Native American programs. In addition, each federal agency must ensure that public documents, notices, and hearings are readily accessible to the public. No disproportionately high or adverse human health or environmental effects on

minority and low-income communities have been identified. Mailing notices and distribution of other project information includes property owners and potentially affected persons and institutions without any distinction based on minority or income status.

7.9.6 Executive Order 11988 (Floodplain Management)

Executive Order 11988 on Floodplain Management requires the Corps to provide leadership and take action to: 1) avoid development in the base (100-year) floodplain; 2) reduce the hazards and risks associated with floods; 3) minimize the impact of floods on human safety, health, and welfare; and 4) restore and preserve the natural and beneficial values of the base flood plain. The Proposed Action is in compliance with this executive order.

8.0 LIST OF PREPARERS

A list of preparers for the SSWD long-term WA contract EA/BA is provided in **Table 8-1.**

Table 8-1. List of preparers.

Name	Qualifications	Expertise	Years of Experience	Participation
Surface Water Resources, Inc.				
George "Buzz" Link	B.S. 1975 Civil Engineering	Hydrologic Modeling and CVP Power	25	Hydrologic analytical framework and methodology; hydropower; hydrology and water supply; Reclamation operations and modeling liaison
Paul Bratovich	M.S. 1985 Fisheries Resources B.S. 1977 Fisheries	Fisheries Biology; Endangered Species; Flow-Habitat Relationships	21	Fisheries and aquatic resources
Bill Smith	B.S. 1976 Forest Engineering	Hydrologic and Temperature Modeling	25	Hydrologic analytical framework and methodology; water temperature analysis
Patti Idlof	B.S. 1982 Natural Resource Management	CEQA/NEPA Compliance; Environmental Impacts Analysis	18	Project Manager; alternatives identification, screening, and development; project overview; cumulative impacts; ESA facilitations; and EA/IS document management
Amanda O'Connell	M.S. 2003 Environmental Policy and Planning	Environmental Impacts Analysis; Environmental Planning	3	Environmental analysis; land use; species occurrence and habitat identification
Adrian Pitts	B.S. 1997 Biological Sciences	Fisheries Biology; Endangered Species	5	Fisheries and aquatic resources impacts analyses
Allison Dvorak	M.S. 2000 Hydrologic Sciences B.S. 1998 Earth and Atmospheric Sciences	Hydrologic Modeling; Environmental Impacts Analysis	5	Hydrologic analytical framework and methodology; CALSIM hydrologic analysis
Linda Standlee		Administrative Support; Document Management	17	Document editing and formatting

Table 8-1. List of preparers.

Name	Qualifications	Expertise	Years of Experience	Participation
Meryka Atherstone	B.S. 2001 Earth Systems Science and Policy	Environmental Impacts Analysis; Environmental Planning	5	Environmental analysis
Karen Riggs	B.A. 2001 Environmental Studies	Environmental Impacts Analysis	3	Environmental analysis
U.S. Bureau of Reclamation				
Rob Schroeder	B.S. Environmental Resources	Resource Manager	30	Environmental assessment review and oversight
Brian Deason	B.S Biology	Environmental Specialist	4	Environmental assessment review and oversight

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PERSONAL COMMUNICATION

Jones, S., Placer County Water Agency, Auburn, California; Telephone conversation with K. Riggs, Planner, Surface Water Resources, Inc., Sacramento, California; Power Generation, June 1, 2004.

Jung, W., Manager, Engineering Services, San Juan Suburban Water District, Sacramento, CA; Email communication with P. Idlof, Project Manager/Senior Environmental Planner, HDR | SWRI, Sacramento, CA; Admin Draft Long-Term WA EA, June 16, 2006.

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APPENDIX A
SACRAMENTO SUBURBAN WATER DISTRICT
LONG-TERM WARREN ACT CONTRACT
ENVIRONMENTAL ASSESSMENT

Draft Long-Term Warren Act Contract Between the United States of America and Sacramento Suburban Water District

PREPARED FOR:

SACRAMENTO SUBURBAN WATER DISTRICT
CLEARLY REFRESHING SERVICE!

PREPARED BY:

HDR | SWRI Surface Water Resources, Inc.

OCTOBER 2006

Long-Term Warren Act Contract No.
05-WC-20-3279

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

CONTRACT FOR CONVEYANCE OF NON-PROJECT WATER BETWEEN THE UNITED STATES AND SACRAMENTO SUBURBAN WATER DISTRICT

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Long-Term Warren Act Contract No.
05-WC-20-3279

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

CONTRACT FOR CONVEYANCE OF NON-PROJECT WATER
BETWEEN THE UNITED STATES
AND
SACRAMENTO SUBURBAN WATER DISTRICT

THIS CONTRACT, made this _____ day of _____, 20__, pursuant to the Act of June 17, 1902 (32 Stat. 388), as amended and supplemented, the Act of February 21, 1911 (36 Stat. 925), Section 305 of the Reclamation States Emergency Drought Relief Act of 1991 (106 Stat. 59); and Title XXXIV of the Act of October 30, 1992, the Central Valley Project Improvement Act (106 Stat. 4706), all collectively hereinafter referred to as the Federal Reclamation laws, between THE UNITED STATES OF AMERICA, hereinafter referred to as the United States, acting through the Bureau of Reclamation, hereinafter referred to as the Contracting Officer, and the SACRAMENTO SUBURBAN WATER DISTRICT, hereinafter referred to as the Contractor,

WITNESSETH, That:

EXPLANATORY RECITALS

WHEREAS, the United States has constructed and is operating the Central Valley Project (Project), California, for diversion, storage, carriage, distribution and beneficial use, flood control, irrigation, municipal, domestic, industrial, fish and wildlife mitigation, protection and restoration, generation and distribution of electric energy, salinity control, navigation and other beneficial uses, of waters of the Sacramento River, the American River, the Trinity River, and the San Joaquin River and their tributaries; and

WHEREAS, the Contractor has or will acquire a supply of Non-Project Water and has requested that the United States convey said water through Excess Capacity in Project Facilities of the Project for municipal and industrial (M&I) purposes; and

WHEREAS, the Contractor and the United States entered into Contract No. 05-WC-20-2918 dated March 1, 2005, which provides for conveyance and/or storage of Non-Project Water in facilities of the Project through February 28, 2006; and

WHEREAS, the United States is willing to convey said water to the Contractor through Excess Capacity in Project Facilities in accordance with the terms and conditions of this Contract;

WHEREAS, the United States has also entered into similar contracts for the conveyance of Non-Project Water, provided by the Placer County Water Agency (PCWA), with the City of Roseville and the San Juan Water District; and

WHEREAS, the Contractor and Contracting Officer recognize that this Contract does not grant any permission or entitlement to the Contractor to extract or divert from its sources the Non-Project Water supply conveyed pursuant to this Contract;

NOW, THEREFORE, in consideration of the covenants herein contained, the parties agree as follows:

DEFINITIONS

1. When used herein, the term:

(a) "Calendar Year" shall mean the period January 1 through December 31, both dates inclusive;

(b) "Contracting Officer" shall mean the Secretary of the Interior's duly authorized representative acting pursuant to this Contract or applicable Reclamation law or regulation;

(c) "Contractor's Point of Delivery" shall mean the 84-inch pipeline (Folsom Pipeline) leading from Folsom Pumping Plant to the "Hinkle Y";

(d) "Excess Capacity" shall mean the capacity of the Project Facilities not needed to store and/or convey Project Water as determined by the Contracting Officer;

(e) "M&I Water" shall mean all uses of Non-Project Water for other than the commercial production of agricultural crops or livestock, including domestic use incidental thereto;

(f) "Non-Project Water" shall mean water acquired by or available to the Contractor from the source(s) identified in Exhibit B, attached hereto and incorporated herein by reference;

(g) "PCWA" shall mean the Placer County Water Agency, a political subdivision of the State of California, duly organized with its principal place of business in Auburn, California.

(h) "PCWA Water Contract" shall mean the contract for a water supply of up to 29,000 acre-feet annually dated June 1, 2000, between the Contractor's predecessor in interest, Northridge Water District, and PCWA titled, "Agreement Between Placer County Water Agency and Northridge Water District for a Water Supply for Groundwater Stabilization," and any amendment, extension or renewal thereof;

(i) "Project" shall mean the Central Valley Project owned by the United States and operated by the Department of Interior, Bureau of Reclamation;

(j) "Project Facilities" shall mean the Folsom Reservoir, Folsom Pumping Plant, and Folsom Pipeline of the Project;

(k) "Project Water" shall mean all water that is developed, diverted, stored, or delivered by the United States in accordance with the statutes authorizing the Project and in accordance with the terms and conditions of applicable water rights permits and licenses acquired by and/or issued to the United States pursuant to California law;

(l) "Rates" shall mean the payments determined annually by the Contracting Officer in accordance with the then current applicable water rate setting policies for the Project;

(m) "Secretary" shall mean the Secretary of the Interior, a duly appointed successor, or an authorized representative;

(n) "Year" shall mean the period March 1 of each Calendar Year through the last day of February of the following Calendar Year, both dates inclusive.

TERM OF CONTRACT

2. (a) This Contract shall become effective on March 1, 2006, and shall remain in effect through February 28, 2031, unless terminated by the operation of law or by mutual

agreement of the parties hereto. Provided, that upon 30 days' advance written notice to the Contractor, this Contract may be terminated by the Contracting Officer at an earlier date, if the Contracting Officer determines that the Contractor has not been complying with one or more of the terms and conditions of this Contract; Provided further, that the Contracting Officer may make a determination not to terminate this Contract if the Contractor can show full compliance or a time schedule for compliance that is satisfactory to the Contracting Officer within the 30-day notice period.

(b) The Contractor shall promptly notify the Contracting Officer if and when the Contractor ceases to have any right to the use of the Non-Project Water being conveyed pursuant to this Contract.

CONVEYANCE, POINTS OF DELIVERY, AND MEASUREMENT OF NON-PROJECT WATER

3. (a) The Contractor may cause up to 29,000 acre-feet of Non-Project Water each Year to be introduced into Folsom Reservoir from the source(s) listed in Exhibit B. The United States shall convey said water to the Contractor's Point of Delivery through Excess Capacity in Project Facilities in accordance with a schedule, or any revision or revisions thereof, submitted by the Contractor and approved by the Contracting Officer during the term hereof. If at any time the Contracting Officer determines that there will not be Excess Capacity in Project Facilities sufficient to receive, transport, and convey the Non-Project Water in accordance with the approved schedule, the Contracting Officer shall so notify the Contractor in writing. Within 24 hours of said notice, the Contractor shall revise its schedule accordingly.

(b) The amount of Non-Project Water conveyed to the Contractor through Project Facilities in any 30-day period shall not exceed the quantity of Non-Project Water previously introduced into Folsom Reservoir by the Contractor. The Contractor will be responsible for requiring PCWA to make releases during the months of July, August, September, and October and any other month the California State Water Resources Control Board determines that PCWA has no right to divert the natural flow of the American River, from PCWA's upstream reservoirs, of the quantity of water that equals the quantity of water that the Contractor has scheduled to introduce into Folsom Reservoir during each of those months, plus five percent for transportation losses.

(c) Exhibit B may be modified or replaced by agreement of the parties to reflect any changes made to sources of Non-Project Water to be conveyed hereunder, without amending this Contract.

(d) The Non-Project Water shall be used as M&I Water only.

(e) Non-Project Water that is introduced into Folsom Reservoir by the Contractor, and remains there for less than 30 days, shall not be deemed unused water available to the United States for Project purposes. Conversely, Non-Project Water that is introduced into Folsom Reservoir by the Contractor, and remains there for 30 days or more, shall be deemed to be unused water available to the United States for Project purposes. Non-Project Water delivered to Project Facilities shall be accounted for on a first-in, first-out basis. Similarly, Non-Project Water that is introduced into Folsom Reservoir but not conveyed prior to the expiration of this Contract shall also be deemed unused water available to the United States for Project purposes.

(f) The Contractor shall be responsible for the acquisition and payment of all electrical power and associated transmission service charges required to pump the Non-Project Water through Project Facilities. Conveyance of Non-Project Water pursuant to this Contract will not be supported with Project-use power.

(g) Non-Project Water conveyed by the United States to the Contractor pursuant to this Contract will be conveyed to the Contractor's Point of Delivery established pursuant to subdivision (e) of Article 1.

(h) The Contractor shall utilize the Non-Project Water conveyed pursuant to this Contract in accordance with all requirements of any applicable Biological Opinion.

(i) All Non-Project Water conveyed to the Contractor pursuant to this Contract shall be measured and recorded with equipment furnished, installed, operated, and maintained by the Contractor. Upon the request of either party to this Contract, the Contractor shall investigate the accuracy of such measurements and shall take any necessary steps to adjust any errors appearing therein.

SCHEDULING AND REPORTING OBLIGATIONS OF THE CONTRACTOR

4. (a) On or before each March 1, or at such other times as the Contracting Officer determines to be necessary, the Contractor shall submit to the Contracting Officer a written schedule, satisfactory to the Contracting Officer, showing the dates and estimated monthly quantities of Non-Project Water to be introduced into Folsom Reservoir and conveyed by the United States to the Contractor pursuant to this Contract for the upcoming Year. During each month, the Contractor will revise said schedule if necessary to reflect the actual amount of

Non-Project Water introduced into Folsom Reservoir and conveyed by the United States to the Contractor pursuant to this Contract.

(b) For each month, before the 10th day of the succeeding month, the Contractor shall furnish a monthly report of daily operations that is satisfactory to the Contracting Officer which tabulates PCWA's right to the natural flow in the American River, the quantity of releases from PCWA's upstream storage, and the quantity of Non-Project Water scheduled by the Contractor pursuant to this Contract.

(c) The Contractor shall advise the Contracting Officer on or before the 10th calendar day of each month of the actual daily quantities of Non-Project Water taken the previous month by the Contractor at the Contractor's Point of Delivery pursuant to this Contract. At the same time, the Contractor shall provide the Contracting Officer with daily operational reports demonstrating that PCWA or other entity providing Non-Project Water to the Contractor has made sufficient water available in Folsom Reservoir for subsequent delivery of Non-Project Water to the Contractor.

PAYMENT FOR CONVEYANCE

5. (a) The Rates to be paid to the United States for Non-Project Water conveyed pursuant to this Contract are set forth in Exhibit A and are subject to annual adjustment pursuant to the then current Project M&I Rate Setting Policy to cover all costs incurred for the conveyance of said Non-Project Water.

(b) By December 31 of each Calendar Year, the Contracting Officer shall provide the Contractor with the final Rates to be in effect for the upcoming Year, and such notification shall revise Exhibit "A."

(c) The Contractor agrees to pay for Non-Project Water conveyed pursuant to this Contract at the cost-of-service rate as calculated in accordance with the Project M&I Rate Setting Policy.

(d) At the time the Contractor submits an initial schedule for the conveyance of Non-Project Water pursuant to subdivision (a) of Article 4 of this Contract, the Contractor shall pay the Contracting Officer one-half of the total amount payable for the Non-Project Water scheduled to be conveyed for the Year. The Contractor shall pay the remainder of the amount payable for Non-Project Water scheduled to be conveyed for the Year on or before September 1 of the respective Year. Non-Project Water will not be conveyed in advance of payment.

(e) All revenues received from the use of Project facilities, pursuant to subdivision (a) of this Article for conveyance of Non-Project Water, shall be deposited into the Reclamation fund for use under the terms of the Reclamation Act as provided in Section 3 of the Act of February 21, 1911 (36 Stat.925); Provided, that if the Act of February 21, 1911, is amended, superseded, or replaced, any new provisions addressing the distribution of revenues will apply to this Contract at the earliest date possible under the law.

(f) If at any time the Contractor diverts more Non-Project Water from Project Facilities than the quantity that was scheduled pursuant to subdivision (a) of Article 4 of this Contract, then the Contractor shall ensure that PCWA will release additional Non-Project Water to be introduced into Folsom Reservoir equal to the quantity actually used plus five percent for conveyance or transportation losses, and shall pay for conveyance of this additional Non-Project Water at the Rates identified in Exhibit A.

UNITED STATES NOT RESPONSIBLE FOR CONVEYANCE OF NON-PROJECT WATER

6. The United States shall not be responsible for the control, care, or distribution of the Non-Project Water before it is introduced into Folsom Reservoir or after it is conveyed to the Contractor's Point of Delivery.

ADJUSTMENTS

7. The amount of any overpayment by the Contractor by reason of the quantity of Non-Project Water conveyed for the Contractor pursuant to this Contract, as conclusively determined by the Contracting Officer, having been less than the quantity which the Contractor otherwise under the provisions of this Contract would have been required to pay, shall be applied first to any accrued indebtedness arising out of this Contract then due and owing to the United States by the Contractor. Any amount of such overpayment then remaining shall be refunded to the Contractor.

UNITED STATES NOT LIABLE

8. The Contractor hereby releases and agrees to defend and indemnify the United States and its officers, agents, and employees from every claim for damage to persons or property, direct or indirect, resulting from the Contractor's performance of this Contract, including the introduction of Non-Project Water into Folsom Reservoir and the diversion and/or extraction of Non-Project Water from Project Facilities. The Contractor further releases the United States and its officers, agents, and employees from every claim for damage to persons or property, direct or indirect, resulting from the Contracting Officer's determinations of the amount of Excess Capacity available in Project Facilities for the conveyance of Non-Project Water to the Contractor, and the elimination of the source of the Non-Project Water. Nothing contained in

this Article shall be construed as an assumption of liability by the Contractor with respect to such matters.

OPINIONS AND DETERMINATIONS

9. (a) Where the terms of this Contract provide for actions to be based upon the opinion or determination of either party to this Contract, said terms shall not be construed as permitting such action to be predicated upon arbitrary, capricious, or unreasonable opinions or determinations. Both parties, notwithstanding any other provisions of this Contract, expressly reserve the right to relief from and appropriate adjustment for any such arbitrary, capricious, or unreasonable opinion or determination. Each opinion or determination by either party shall be provided in a timely manner.

(b) The Contracting Officer shall have the right to make determinations necessary to administer this Contract that are consistent with the expressed and implied provisions of this Contract, the laws of the United States and the State of California, and the rules and regulations promulgated by the Secretary of the Interior. Such determinations shall be made in consultation with the Contractor to the extent reasonably practicable.

CONTRACTOR TO PAY CERTAIN MISCELLANEOUS COSTS

10. In addition to all other payments to be made by the Contractor pursuant to this Contract, the Contractor shall pay to the United States, within 60 days after receipt of a bill and detailed statement submitted by the Contracting Officer to the Contractor, for such specific items of direct cost incurred by the United States for work requested by the Contractor associated with this Contract plus indirect costs in accordance with applicable Bureau of Reclamation policy and procedures. All such amounts referred to in this Article shall not exceed the amount agreed to in

writing in advance by the Contractor. This Article shall not apply to costs for routine contract administration.

MEDUIM FOR TRANSMITTING PAYMENTS

11. (a) All payments from the Contractor to the United States under this Contract shall be by the medium requested by the United States on or before the date payment is due. The required method of payment may include checks, wire transfers, or other types of payment specified by the United States.

(b) Upon execution of the Contract, the Contractor shall furnish the Contracting Officer with the Contractor's taxpayer's identification number (TIN). The purpose for requiring the Contractor's TIN is for collecting and reporting any delinquent amounts arising out of the Contractor's relationship with the United States.

CHARGES FOR DELINQUENT PAYMENTS

12. (a) The Contractor shall be subject to interest, administrative and penalty charges on delinquent payments. If a payment is not received by the due date, the Contractor shall pay an interest charge on the delinquent payment for each day the payment is delinquent beyond the due date. If a payment becomes 60 days delinquent, in addition to the interest charge, the Contractor shall pay an administrative charge to cover additional costs of billing and processing the delinquent payment. If a payment is delinquent 90 days or more, in addition to the interest and administrative charges, the Contractor shall pay a penalty charge for each day the payment is delinquent beyond the due date, based on the remaining balance of the payment due at the rate of 6 percent per year. The Contractor shall also pay any fees incurred for debt collection services associated with a delinquent payment.

(b) The interest charge rate shall be the greater of the rate prescribed quarterly in the Federal Register by the Department of the Treasury for application to overdue payments or the interest rate of 0.5 percent per month. The interest charge rate will be determined as of the due date and remain fixed for the duration of the delinquent period.

(c) When a partial payment on a delinquent account is received, the amount received shall be applied first to the penalty charges, second to the administrative charges, third to the accrued interest, and finally to the overdue payment.

PROTECTION OF WATER AND AIR QUALITY

13. (a) Project facilities used to make available and deliver water to the Contractor shall be operated and maintained in the most practical manner to maintain the quality of the water at the highest level possible as determined by the Contracting Officer: Provided,

That the United States does not warrant the quality of the water delivered to the Contractor and is under no obligation to furnish or construct water treatment facilities to maintain or improve the quality of water delivered to the Contractor.

(b) The Contractor shall comply with all applicable water and air pollution laws and regulations of the United States and the State of California; and shall obtain all required permits or licenses from the appropriate Federal, State, or local authorities necessary for the delivery of water by the Contractor; and shall be responsible for compliance with all Federal, State, and local water quality standards applicable to surface and subsurface drainage and/or discharges generated through the use of Federal or Contractor's facilities or project water provided by the Contractor within the Contractor's Project Water Service Area.

(c) This Article shall not affect or alter any legal obligations of the Secretary to provide drainage or other discharge services.

(d) If it is determined by the Contracting Officer that the quality of the source of the Non-Project Water identified in Exhibit B, conveyed pursuant to this Contract will significantly degrade the quality of Project Water in Folsom Reservoir, the Contractor, upon receipt of written notice from the Contracting Officer, shall arrange for the immediate termination of the introduction of such source of Non-Project Water into Project Facilities.

GENERAL OBLIGATION--BENEFITS CONDITIONED UPON PAYMENT

14. (a) The obligation of the Contractor to pay the United States as provided in this Contract is a general obligation of the Contractor notwithstanding the manner in which the obligation may be distributed among the Contractor's water users and notwithstanding the default of individual water users in their obligations to the Contractor.

(b) The payment of charges becoming due pursuant to this Contract is a condition precedent to receiving benefits under this Contract. The United States shall not make water available to the Contractor through Project facilities during any period in which the Contractor is in arrears in the advance payment of water rates due the United States. The Contractor shall not deliver water under the terms of this Contract for lands or parties which are in arrears in the advance payment of water rates levied or established by the Contractor.

RULES, REGULATIONS, AND DETERMINATIONS

15. (a) The parties agree that the delivery of water or the use of Federal facilities pursuant to this Contract is subject to Federal reclamation law, as amended and supplemented,

and the rules and regulations promulgated by the Secretary of the Interior under Federal reclamation law.

(b) The Contracting Officer shall have the right to make determinations necessary to administer this Contract that are consistent with the expressed and implied provisions of this Contract, the laws of the United States and the State, and the rules and regulations promulgated by the Secretary of the Interior. Such determinations shall be made in consultation with the Contractor.

EQUAL EMPLOYMENT OPPORTUNITY

16. During the performance of this Contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, disability, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, disability, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, disability, or national origin.

(3) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the Contracting Officer, advising the said labor union or workers' representative of the Contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts

by the Contracting Officer and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the such rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The Contractor will include the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

BOOKS, RECORDS AND REPORTS

17. (a) The Contractor shall establish and maintain accounts and other books and records pertaining to administration of the terms and conditions of this Contract, including the Contractor's financial transactions; water supply data; project operation, maintenance, and replacement logs; Project land and rights-of-way use agreements; the water users' land-use (crop census), land-ownership, land-leasing, and water-use data; and other matters that the Contracting Officer may require. Reports shall be furnished to the Contracting Officer in such form and on such date or dates as the Contracting Officer may require. Subject to applicable Federal laws and regulations, each party to this Contract shall have the right during office hours to examine and make copies of the other party's books and records relating to matters covered by this Contract.

(b) Notwithstanding the provisions of subdivision (a) of this Article, no books, records, or other information shall be requested from the Contractor by the Contracting Officer unless such books, records, or information are reasonably related to the administration or performance of this Contract. Any such request shall allow the Contractor a reasonable period of time within which to provide the requested books, records, or information.

CONTINGENT ON APPROPRIATION OR ALLOTMENT OF FUNDS

18. The expenditure or advance of any money or the performance of any obligation of the United States under this Contract shall be contingent upon appropriation or allotment of funds. Absence of appropriation or allotment of funds shall not relieve the Contractor from any obligations under this Contract. No liability shall accrue to the United States in case funds are not appropriated or allotted.

ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

19. The provisions of this Contract shall apply to and bind the successors and assigns of the parties hereto, but no assignment or transfer of this Contract or any right or interest therein by either party shall be valid until approved in writing by the other party.

OFFICIALS NOT TO BENEFIT

20. No Member of or Delegate to the Congress, Resident Commissioner, or official of the Contractor shall benefit from this Contract other than as a water user or landowner in the same manner as other water users or landowners.

COMPLIANCE WITH CIVIL RIGHTS LAWS AND REGULATIONS

21. (a) The Contractor shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d), Section 504 of the Rehabilitation Act of 1975 (P.L. 93-112, as amended), the Age Discrimination Act of 1975 (42 U.S.C. 6101, *et seq.*) Title III of the Americans with Disabilities Act of 1990, and any other applicable civil rights laws, as well as with their respective implementing regulations and guidelines imposed by the U.S. Department of the Interior and/or Bureau of Reclamation.

(b) These statutes require that no person in the United States shall be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving financial assistance from the Bureau of Reclamation on the grounds of race, color, national origin, disability, or age. By executing this Contract, the Contractor agrees to immediately take any measures necessary to implement this obligation, including permitting officials of the United States to inspect premises, programs, and documents.

(c) The Contractor makes this agreement in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property discounts, or other Federal financial assistance extended after the date hereof to the Contractor by the Bureau of Reclamation, including installment payments after such date on account of arrangements for Federal financial assistance which were approved before such date. The Contractor recognizes and agrees that such Federal assistance will be extended in reliance on the representations and

agreements made in this Article, and that the United States reserves the right to seek judicial enforcement thereof.

(d) Complaints of discrimination against the Contractor shall be investigated by the Contracting Officer's Office of Civil Rights.

CONTRACT DRAFTING CONSIDERATIONS

22. Articles 1 through 23 of this Contract have been drafted, negotiated, and reviewed by the parties hereto, each of whom is sophisticated in the matters to which this Contract pertains, and no one party shall be considered to have drafted the stated articles.

NOTICES

23. Any notice, demand, or request authorized or required by this Contract shall be deemed to have been given, on behalf of the Contractor, when mailed, postage prepaid, or delivered to the Area Manager, Mid-Pacific Region, United States Department of Interior, Bureau of Reclamation, 7794 Folsom Dam Road, Folsom, California 95630-1799, and on behalf of the United States, when mailed, postage prepaid, or delivered to the Board of Directors, Sacramento Suburban Water District, 3701 Marconi Avenue, Suite 100, Sacramento, California 95821-5303. The designation of the addressee or the addressee or the address may be changed by notice given in the same manner as provided in this Article for other notices.

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

By: _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

(SEAL)

SACRAMENTO SUBURBAN WATER DISTRICT

By: _____
General Manager

Attest:

By: _____
Secretary

(H:\pub440\long-term Warren Act Contracts/SSWD Warren Act Formatted Final 12.27.05.doc)

EXHIBIT A

2005 WATER RATES

Project Warren Act Contracts
M&I Water per acre-foot

Cost Component	Cost of Service
Water Marketing	$ 3.89
Storage	
O&M	$ 6.67
Capital	$ 5.15
Total Cost of Service	$15.71

EXHIBIT B

SOURCE(S) OF NON-PROJECT WATER

The source of Non-Project water shall be PCWA's Middle Fork American River Project under water right permit Nos. 13856 and 13858 granted by the California State Water Resources Control Board.

APPENDIX B
SACRAMENTO SUBURBAN WATER DISTRICT
LONG-TERM WARREN ACT CONTRACT
ENVIRONMENTAL ASSESSMENT

USFWS, NMFS, and CDFG CNDDB Lists of Special-Status Species

PREPARED FOR:

SACRAMENTO SUBURBAN WATER DISTRICT
CLEARLY REFRESHING SERVICE!

PREPARED BY:

HDR | SWRI Surface Water Resources, Inc.

OCTOBER 2006

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS/R-E-D
1	*Accipiter cooperii* Cooper's hawk	ABNKC12040			G5	S3	SC
2	*Accipiter gentilis* northern goshawk	ABNKC12060			G5	S3	SC
3	*Agelaius tricolor* tricolored blackbird	ABPBXB0020			G2G3	S2	SC
4	*Allium jepsonii* Jepson's onion	PMLIL022V0			G1	S1.2	1B.2-2-3
5	*Ammoniella yatesi* light roll (Yates) snail	IMGAS90010			G1	S1	
6	*Andrena blennospermatis*	IIHYM35030			G2	S2	
7	*Andrena subapasta*	IIHYM35050			G1G3	S1S3	
8	*Aplodontia rufa californica* Sierra Nevada mountain beaver	AMAFA01013			G5T3T4	S3?	SC
9	*Archoplites interruptus* Sacramento perch	AFCQS07010			G3	S1	SC
10	*Arctostaphylos nissenana* Nissenan manzanita	PDERI040V0			G2	S2.2	1B.2-2-3
11	*Ardea alba* great egret	ABNGA04010			G5	S4	
12	*Ardea herodias* great blue heron	ABNGA04040			G5	S4	
13	*Athene cunicularia* burrowing owl	ABNSB10010			G4	S2	SC
14	*Balsamorhiza macrolepis var. macrolepis* big-scale balsamroot	PDAST11061			G3G4T2	S2.2	1B.2-2-3
15	*Banksula californica*	ILARA14020			GH	SH	
16	*Banksula gallia*	ILARA14040			G1	S1	
17	*Branchinecta lynchi* vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
18	*Branchinecta mesovallensis* midvalley fairy shrimp	ICBRA03150			G2	S2	
19	*Buteo swainsoni* Swainson's hawk	ABNKC19070		Threatened	G5	S2	
20	*Calystegia stebbinsii* Stebbins's morning-glory	PDCON040H0	Endangered	Endangered	G1	S1.1	1B.2-3-3
21	*Ceanothus roderickii* Pine Hill ceanothus	PDRHA04190	Endangered	Rare	G2	S2.1	1B.2-2-3
22	*Chlorogalum grandiflorum* Red Hills soaproot	PMLIL0G020			G2	S2.2	1B.2-2-3
23	*Clarkia biloba ssp. brandegeeae* Brandegee's clarkia	PDONA05053			G4G5T2	S2.2	1B.2-2-3
24	*Cypseloides niger* black swift	ABNUA01010			G4	S2	SC
25	*Desmocerus californicus dimorphus* valley elderberry longhorn beetle	ICCOL48011	Threatened		G3T2	S2	

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS/R-E-D
26	***Downingia pusilla*** dwarf downingia	PDCAM060C0			G3	S3 1	2/1-2-1
27	***Dumontia oregonensis***	ICBRA23010			G1G3	S1	
28	***Elanus leucurus*** white-tailed kite	ABNKC06010			G5	S3	
29	***Elderberry Savanna***	CTT63440CA			G2	S2 1	
30	***Emys (=Clemmys) marmorata*** western pond turtle	ARAAD02030			G3G4	S3	SC
31	***Emys (=Clemmys) marmorata marmorata*** northwestern pond turtle	ARAAD02031			G3G4T3	S3	SC
32	***Fremontodendron decumbens*** Pine Hill flannelbush	PDST E03035	Endangered	Rare	G1	S1.2	1B-3-2-3
33	***Fritillaria eastwoodiae*** Butte County fritillary	PMLI L0V060			G3G	S3.2	3/3-2-3
34	***Galium californicum ssp. sierrae*** El Dorado bedstraw	PDRUB0N0F7	Endangered	Rare	G5T1	S1.2	1B-3-2-3
35	***Gratiola heterosepala*** Boggs Lake hedge-hyssop	PDSCR0R060		Endangered	G3	S3 1	1B-1-2-2
36	***Great Valley Cottonwood Riparian Forest***	CTT61410CA			G2	S2 1	
37	***Gulo gulo*** California wolverine	AMAJF03012		Threatened	G4T3Q	S2	
38	***Haliaeetus leucocephalus*** bald eagle	ABNKC10010	Threatened	Endangered	G4	S2	
39	***Helianthemum suffrutescens*** Bisbee Peak rush-rose	PDCIS020F0			G2Q	S2 2	3/2-2-3
40	***Hibiscus lasiocarpus*** rose-mallow	PDMAL0H0D0			G4	S2 2	2/2-2-1
41	***Histrionicus histrionicus*** harlequin duck	ABNJB15010			G4	S3	SC
42	***Horkelia parryi*** Parry's horkelia	PDROS0W0C 0			G2	S2 2	1B-2-2-3
43	***Hydrochara ricksockeri*** Ricksecker's water scavenger beetle	IICOL5V010			G1G2	S1S2	
44	***Juncus leiospermus var. ahartii*** Ahart's dwarf rush	PMJUN011L1			G2T1	S1 2	1B-3-2-3
45	***Legenere limosa*** legenere	PDCAM0C010			G2	S2 2	1B-2-3-3
46	***Lepidurus packardi*** vernal pool tadpole shrimp	ICBRA10010	Endangered		G3	S2S3	
47	***Lewisia serrata*** saw-toothed lewisia	PDPOR040E0			G2	S2 2	1B-3-3-3
48	***Linderiella occidentalis*** California linderiella	ICBRA06010			G3	S2S3	
49	***Martes americana sierrae*** Sierra Marten	AMAJF01014			G5T2T4	S3S4	

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS/R-E-D
50	***Martes pennanti pacifica*** Pacific fisher	AMAJF01021	Candidate		G5T3T4Q	S2S3	SC
51	***Megaleuctra sierra*** Shirttail Creek stonefly	IIPLE0G040			G1?Q	S1?	
52	***Navarretia myersii ssp. myersii*** pincushion navarretia	PDPLM0C0X1			G1T1	S1.1	1B/3-3-3
53	***Northern Claypan Vernal Pool***	CTT44120CA			G1	S1.1	
54	***Northern Hardpan Vernal Pool***	CTT44110CA			G3	S3.1	
55	***Northern Volcanic Mud Flow Vernal Pool***	CTT44132CA			G1	S1.1	
56	***Orcuttia viscida*** Sacramento orcutt grass	PMPOA4G070	Endangered	Endangered	G1	S1.1	1B/3-3-3
57	***Orobittacus obscurus*** gold rush hanging scorpionfly	IIMEC10010			G1	S1	
58	***Pandion haliaetus*** osprey	ABNKC01010			G5	S3	SC
59	***Phacelia stebbinsii*** Stebbins's phacelia	PDHYD0C4D0			G3	S3.2	1B/2-2-3
60	***Phalacrocorax auritus*** double-crested cormorant	ABNFD01020			G5	S3	SC
61	***Pogonichthys macrolepidotus*** Sacramento splittail	AFCJB34020			G2	S2	SC
62	***Progne subis*** purple martin	ABPAU01010			G5	S3	SC
63	***Rana aurora draytonii*** California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3	SC
64	***Rana boylii*** foothill yellow-legged frog	AAABH01050			G3	S2S3	SC
65	***Rhyacophila spinata*** spiny rhyacophilan caddisfly	IITRI19080			G1G2	S1S2	
66	***Riparia riparia*** bank swallow	ABPAU08010		Threatened	G5	S2S3	
67	***Sagittaria sanfordii*** Sanford's arrowhead	PMALI040Q0			G3	S3.2	1B/2-2-3
68	***Senecio layneae*** Layne's ragwort	PDAST8H1V0	Threatened	Rare	G2	S2.1	1B/2-2-3
69	***Spea (=Scaphiopus) hammondii*** western spadefoot	AAABF01030			G3	S3	SC
70	***Taxidea taxus*** American badger	AMAJF04010			G5	S4	SC
71	***Thamnophis gigas*** giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	
72	***Valley Needlegrass Grassland***	CTT42110CA			G1	S3.1	
73	***Viburnum ellipticum*** oval-leaved viburnum	PDCPR07080			G5	S2.3	2/2-1-1
74	***Wyethia reticulata*** El Dorado County mule ears	PDAST9X0D0			G2	S2.2	1B/2-2-3

SURFACE WATER RESOURCES, INC.

August 11, 2005

Mr. Rodney R. McInnis, Acting Regional Director
Sacramento Area Office
National Marine Fisheries Service
650 Capitol Mall, Suite 8-600
Sacramento, CA 95814-4706

Subject: Species List for the Sacramento Suburban Water District Long-term Warren Act Project, Sacramento County, California

Dear Mr. McInnis:

Surface Water Resources, Inc. (SWRI) is working on behalf of the U.S. Bureau of Reclamation (Reclamation) and Sacramento Suburban Water District (SSWD) on the environmental documentation for a long-term Warren Act contract (the Proposed Action). The purpose of the Proposed Action is to allow for the conveyance through Folsom Reservoir of up to 29,000 AFA of water purchased from the Placer County Water Agency Middle Fork Project for ultimate delivery to the SSWD long-term Warren Act service area in north-central Sacramento County.

We are contacting you to request a list of special-status species potentially occurring in the action area to be used in the preparation of a biological assessment for the Proposed Action. The action area includes a portion of the SSWD service area, a portion of the upper American River basin (French Meadows and Hell Hole reservoirs, the Middle Fork American River below Ralston Afterbay, and the North Fork American River downstream of the confluence with the Middle Fork), Folsom Reservoir and Lake Natoma, and the lower American River from Folsom Dam to its confluence with the Sacramento River. We request that the species list include all special-status species potentially occurring in the following USGS 7½ minute quadrangles where the action area is located:

- Royal Gorge (539B)
- Bunker Hill (539C)
- Wentworth Springs (539D)
- Michigan Bluff (540C)
- Foresthill (541D)
- Tunnel Hill (525B)
- Georgetown (526A)
- Greenwood (526B)
- Auburn (527A)
- Rocklin (527C)
- Pilot Hill (527D)
- Clarksville (511A)
- Folsom (511B)
- Citrus Heights (512A)
- Rio Linda (512B)
- Sacramento East (512C)
- Carmichael (512D)
- Sacramento West (513D)

Please send the species list to my attention at Surface Water Resources, Inc., 2031 Howe Avenue, Suite 110, Sacramento California 95825, or fax it to me at (916) 286-0957.

If you have any questions or need additional information, please do not hesitate to contact me at (916) 563-6381. Thank you very much for your attention to this matter.

Sincerely,

Patricia S. Idlof
Project Manager/Senior Environmental Planner

2031 Howe Avenue • Suite 110 • Sacramento, California 95825
Tel: (916) 563-6360 • FAX: (916) 286-0957 • E-mail: main@swri.net

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

SEP 16 2005

In response refer to:
151422SWR2001SA6097:JCB

Patricia S. Idlof
Surface Water Resources, Inc.
2031 Howe Avenue
Sacramento, California 95825

Dear Ms. Idlof:

Thank you for your letter of August 11, 2005, requesting that NOAA's National Marine Fisheries Service (NMFS) provide a list of threatened, endangered, or special status species that may be affected by the proposed Sacramento Suburban Water District (SSWD) Long-term Warren Act Contract. The proposed action is to allow for the conveyance through Folsom Reservoir of up to 29,000 acre feet annually of water purchased from the Placer County Water Agency Middle Fork project for delivery to the SSWD long-term Warren Act service area in north-central Sacramento County, California.

The following is a list of species under the jurisdiction of NMFS that are presently listed under the Federal Endangered Species Act (Act), as well as those that are proposed for listing, candidate species and species of concern which are likely to be present in the SSWD long-term Warren Act service area:

Endangered:	Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha)*
Threatened:	Central Valley spring-run Chinook salmon (*O. tshawytscha*) Central Valley steelhead (*O. mykiss)*
Candidate:	None
Species of Concern:	Central Valley fall/late fall-run Chinook salmon (*O. tshawytscha*)

Designated Critical Habitat: American River for Central Valley spring-run Chinook salmon; American River, Dry Creek, Auburn Ravine, Doty Ravine, Coon Creek, Secret Ravine, and Miners Ravine for Central Valley steelhead.

While the candidates and Species of Concern presently have no legal protection under the Act, it is within the spirit of the Act to consider project impacts to potentially sensitive candidate species.

Also, we wish to make you aware the Pacific Fisheries Management Council has identified Essential Fish Habitat (EFH) for the Pacific salmon fishery in Amendment 14 to the Pacific Coast Salmon Fishery Management Plan. This EFH designation includes habitat found in the American River, Dry Creek, Auburn Ravine, Doty Ravine, Coon Creek, and associated tributaries.

Please contact John Baker at (916) 930-3616, or via e-mail at john.baker@noaa.gov if you have any questions about this project or need additional information.

Sincerely,

for Rodney R. McInnis
Regional Administrator

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

August 10, 2005

Document Number: 050810055343

Patricia Idlof
Surface Water Resources, Inc.
2031 Howe Avenue, Suite 110
Sacramento, CA 95825

Subject: Species List for Sacramento Suburban Water District Long-term Warren Act Contract

Dear: Ms. Idlof

We are sending this official species list in response to your August 10, 2005 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested. You have stated that this list is for consultation with the Fish & Wildlife Service.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed, candidate and special concern species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be November 08, 2005.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at sacramento.fws.gov/es/branches.htm.

Endangered Species Division

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 050810055343

Database Last Updated: August 8, 2005

Quad Lists

CLARKSVILLE (511A)

Listed Species

Invertebrates

Branchinecta lynchi - vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus - delta smelt (T)

Oncorhynchus mykiss - Central Valley steelhead (T)

Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)

Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Ambystoma californiense - California tiger salamander (T)

Rana aurora draytonii - California red-legged frog (T)

Reptiles

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Plants

Ceanothus roderickii - Pine Hill ceanothus (E)

Fremontodendron californicum ssp. decumbens - Pine Hill flannelbush (E)

Galium californicum ssp. sierrae - El Dorado bedstraw (E)

Senecio layneae - Layne's butterweed (=ragwort) (T)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)

Species of Concern

Invertebrates

Linderiella occidentalis - California linderiella fairy shrimp (SC)

Nebria darlingtoni - South Forks ground beetle (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Branta canadensis leucopareia - Aleutian Canada goose (D)
Buteo regalis - ferruginous hawk (SC)
Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Charadrius montanus - mountain plover (SC)
Cypseloides niger - black swift (SC)
Elanus leucurus - white-tailed (=black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)
Toxostoma redivivum - California thrasher (SC)

Mammals

Corynorhinus (=Plecotus) townsendii townsendii - Pacific western big-eared bat (SC)
Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

Plants

Atriplex joaquiniana - San Joaquin spearscale (SC)
Chlorogalum grandiflorum - Red Hills soaproot (SC)
Helianthemum suffrutescens - Arnador (Bisbee Peak) rush-rose (SLC)
Hypochaeris cretacicola - El Dorado mule-ears (SC)

FOLSOM (511B)

Listed Species

Invertebrates

Branchinecta lynchi - vernal pool fairy shrimp (T)
Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)
Lepidurus packardi - vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Ambystoma californiense - California tiger salamander (T)
Rana aurora draytoni - California red-legged frog (T)

Reptiles

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Plants

Orcuttia viridis - Sacramento Orcutt grass (E)

Proposed Species

Fish

Oncorhynchus tshawytscha - Critical Habitat, Central Valley spring-run chinook (Proposed) (PX)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall late fall-run chinook salmon (C)
Oncorhynchus tshawytscha - Critical habitat, Central Valley fall late fall-run chinook (C)

Species of Concern

Invertebrates

Branchinecta mesovallensis - Midvalley fairy shrimp (SC)
Linderiella occidentalis - California linderiella fairy shrimp (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Branta canadensis leucopareia - Aleutian Canada goose (D)
Buteo regalis - ferruginous hawk (SC)
Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Charadrius montanus - mountain plover (SC)
Cypseloides niger - black swift (SC)
Elanus leucurus - white-tailed (=black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)
Toxostoma redivivum - California thrasher (SC)

Mammals

Corynorhinus (=Plecotus) townsendii townsendii - Pacific western big-eared bat (SC)
Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)

Perognathus inornatus - San Joaquin pocket mouse (SC)

Plants

Navarretia nervosa spp. nervosa - pinenshion navarretia (SC)

CITRUS HEIGHTS (512A)

Listed Species

Invertebrates

Branchinecta lynchi - Critical habitat, vernal pool fairy shrimp (X)
Branchinecta lynchi - vernal pool fairy shrimp (T)
Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)
Lepidurus packardi - vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Ambystoma californiense - California tiger salamander (T)
Rana aurora draytonii - California red-legged frog (T)

Reptiles

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)

Species of Concern

Invertebrates

Branchinecta mesovallensis - Midvalley fairy shrimp (SC)
Linderiella occidentalis - California linderiella fairy shrimp (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii [was *Scaphiopus h.*] - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Branta canadensis leucopareia - Aleutian Canada goose (D)
Buteo regalis - ferruginous hawk (SC)
Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Charadrius montanus - mountain plover (SC)
Elanus leucurus - white-tailed (= black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Grus canadensis tabida - greater sandhill crane (CA)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii townsendii - Pacific western big-eared bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

Plants

Sagittaria sanfordii - valley sagittaria (=Sanford's arrowhead) (SC)

RIO LINDA (512B)

Listed Species

Invertebrates

Branchinecta lynchi - Critical habitat, vernal pool fairy shrimp (X)
Branchinecta lynchi - vernal pool fairy shrimp (T)
Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Lepidurus packardi - vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Ambystoma californiense - California tiger salamander (T)
Rana aurora draytonii - California red-legged frog (T)

Reptiles

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)

Species of Concern

Invertebrates

Branchinecta mesovallensis - Midvalley fairy shrimp (SC)
Linderiella occidentalis - California linderiella fairy shrimp (SC)

Fish

Lampetra ayresi - river lamprey (SC)
Lampetra tridentata - Pacific lamprey (SC)
Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Branta canadensis leucopareia - Aleutian Canada goose (D)

Buteo regalis - ferruginous hawk (SC)
Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Charadrius montanus - mountain plover (SC)
Elanus leucurus - white-tailed (=black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Grus canadensis tabida - greater sandhill crane (CA)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii townsendii - Pacific western big-eared bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

Plants

Legenere limosa - legenere (SC)

SACRAMENTO EAST (512C)

Listed Species

Invertebrates

Branchinecta lynchi - vernal pool fairy shrimp (T)
Desmocerus californicus dimorphus - Critical habitat, valley elderberry longhorn beetle (X)
Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)
Lepidurus packardi - vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus - Critical habitat, delta smelt (X)
Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Ambystoma californiense - California tiger salamander (T)

Rana aurora draytonii - California red-legged frog (T)

Reptiles

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Proposed Species

Fish

Acipenser medirostris - green sturgeon (PT)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall late fall-run chinook salmon (C)

Species of Concern

Invertebrates

Anthicus antiochensis - Antioch Dunes anthicid beetle (SC)
Anthicus sacramento - Sacramento anthicid beetle (SC)
Branchinecta mesovallensis - Mid-Valley fairy shrimp (SC)
Linderiella occidentalis - California linderiella fairy shrimp (SC)

Fish

Lampetra ayresi - river lamprey (SC)
Lampetra tridentata - Pacific lamprey (SC)
Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii (was *Scaphiopus h.*) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Branta canadensis leucopareia - Aleutian Canada goose (D)
Buteo regalis - ferruginous hawk (SC)
Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)

Charadrius montanus - mountain plover (SC)
Elanus leucurus - white-tailed (=black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Grus canadensis tabida - greater sandhill crane (CA)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii townsendii - Pacific western big-eared bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

Plants

Sagittaria sanfordii - valley sagittaria (=Sanford's arrowhead) (SC)

CARMICHAEL (512D)

Listed Species

Invertebrates

Branchinecta lynchi - vernal pool fairy shrimp (T)
Desmocerus californicus dimorphus - Critical habitat, valley elderberry longhorn beetle (X)
Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)
Lepidurus packardi - vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Ambystoma californiense - California tiger salamander (T)
Rana aurora draytonii - California red-legged frog (T)

Reptiles

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Proposed Species

Fish

Oncorhynchus tshawytscha - Critical Habitat, Central Valley spring-run chinook (Proposed) (PX)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)
Oncorhynchus tshawytscha - Critical habitat, Central Valley fall/late fall-run chinook (C)

Species of Concern

Invertebrates

Branchinecta mesovallensis - Midvalley fairy shrimp (SC)
Linderiella occidentalis - California linderiella fairy shrimp (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Branta canadensis leucopareia - Aleutian Canada goose (D)
Buteo regalis - ferruginous hawk (SC)
Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Charadrius montanus - mountain plover (SC)
Elanus leucurus - white-tailed (=black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Grus canadensis tabida - greater sandhill crane (CA)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)

Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii townsendii - Pacific western big-eared bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

Plants

Gratiola heterosepala - Boggs Lake hedge-hyssop (CA)
Juncus leiospermus var. ahartii - Ahart's (dwarf) rush (SC)
Sagittaria sanfordii - valley sagittaria (=Sanford's arrowhead) (SC)

SACRAMENTO WEST (513D)

Listed Species

Invertebrates

Branchinecta lynchi - vernal pool fairy shrimp (T)
Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)
Lepidurus packardi - vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus - Critical habitat, delta smelt (X)
Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - Critical habitat, winter-run chinook salmon (X)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Ambystoma californiense - California tiger salamander (T)
Rana aurora draytonii - California red-legged frog (T)

Reptiles

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Proposed Species

Fish

Acipenser medirostris - green sturgeon (P)
Oncorhynchus tshawytscha - Critical Habitat, Central Valley spring-run chinook (Proposed) (PX)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)
Oncorhynchus tshawytscha - Critical habitat, Central Valley fall/late fall-run chinook (C)

Species of Concern

Invertebrates

Anthicus antiochensis - Antioch Dunes anthicid beetle (SC)
Anthicus sacramento - Sacramento anthicid beetle (SC)
Branchinecta mesovallensis - Midvalley fairy shrimp (SC)
Linderiella occidentalis - California linderiella fairy shrimp (SC)

Fish

Lampetra ayresi - river lamprey (SC)
Lampetra tridentata - Pacific lamprey (SC)
Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Branta canadensis leucopareia - Aleutian Canada goose (D)
Buteo regalis - ferruginous hawk (SC)
Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Charadrius montanus - mountain plover (SC)
Elanus leucurus - white-tailed (=black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Grus canadensis tabida - greater sandhill crane (CA)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)

Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)

Mammals

Corynorhinus (=Plecotus) townsendii townsendii - Pacific western big-eared bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

TUNNEL HILL (525B)

Listed Species

Invertebrates

Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Mammals

Martes pennanti - fisher (C)

Species of Concern

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Accipiter gentilis - northern goshawk (SC)
Baeolophus inornatus - oak titmouse (SLC)
Cinclus mexicanus - American dipper (SLC)

Cypseloides niger - black swift (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Otus flammeolus - flammulated owl (SC)
Picoides albolarvatus - white-headed woodpecker (SC)
Selasphorus rufus - rufous hummingbird (SC)
Strix occidentalis occidentalis - California spotted owl (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Lepus americanus tahoensis - Sierra Nevada snowshoe hare (SC)
Martes americana - American (=pine) marten (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Vulpes vulpes necator - Sierra Nevada red fox (CA)

Plants

Chlorogalum grandiflorum - Red Hills soaproot (SC)
Phacelia stebbinsii - Stebbins' phacelia (SC)

GEORGETOWN (526A)

Listed Species

Invertebrates

Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Plants

Senecio layneae - Layne's butterweed (=ragwort) (T)

Species of Concern

Invertebrates

Goeracea oregona - Sagehen Creek goeracean caddisfly (SC)
Nebria darlingtoni - South Forks ground beetle (SC)

Fish

Hypomesus nipponensis - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Rana boylii - foothill yellow-legged frog (SC)
Spea hammondii (was *Scaphiopus h.*) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Baeolophus inornatus - oak titmouse (SLC)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Cinclus mexicanus - American dipper (SLC)
Cypseloides niger - black swift (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Otus flammeolus - flammulated owl (SC)
Picoides albolarvatus - white-headed woodpecker (SC)
Selasphorus rufus - rufous hummingbird (SC)
Strix occidentalis occidentalis - California spotted owl (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)

Plants

Arctostaphylos nissenana - Nissenan manzanita (SC)

GREENWOOD (526B)

Listed Species

Invertebrates

Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Species of Concern

Invertebrates

Goeracea oregona - Sagehen Creek goracean caddisfly (SC)
Nebria darlingtoni - South Forks ground beetle (SC)
Rhyacophila spinata - spiny rhyacophilan caddisfly (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Rana boylii - foothill yellow-legged frog (SC)
Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Cinclus mexicanus - American dipper (SLC)
Cypseloides niger - black swift (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)

Numenius americanus - long-billed curlew (SC)
Otus flammeolus - flammulated owl (SC)
Picoides albolarvatus - white-headed woodpecker (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)
Strix occidentalis occidentalis - California spotted owl (SC)
Toxostoma redivivum - California thrasher (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

AUBURN (527A)

Listed Species

Invertebrates

Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)

Species of Concern

Invertebrates

Goeracea oregona - Sagehen Creek goracean caddisfly (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Rana boylii - foothill yellow-legged frog (SC)
Spea hammondii [was Scaphiopus h.] - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Buteo lineatus - oak titmouse (SLC)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Cypseloides niger - black swift (SC)
Elanus leucurus - white-tailed (=black-shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)
Toxostoma redivivum - California thrasher (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

ROCKLIN (527C)

Listed Species

Invertebrates

Branchinecta lynchi - vernal pool fairy shrimp (T)
Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)
Lepidurus packardi - vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Reptiles

Thamnophis gigas - giant garter snake (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)

Species of Concern

Invertebrates

Linderiella occidentalis - California linderiella fairy shrimp (SC)
Nebria darlingtoni - South Forks ground beetle (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Branta canadensis leucopareia - Aleutian Canada goose (D)
Buteo regalis - ferruginous hawk (SC)

Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Charadrius montanus - mountain plover (SC)
Cypseloides niger - black swift (SC)
Elanus leucurus - white-tailed (=black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Plegadis chihi - white-faced ibis (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)
Toxostoma redivivum - California thrasher (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

Plants

Gratiola heterosepala - Boggs Lake hedge-hyssop (CA)

PILOT HILL (527D)

Listed Species

Invertebrates

Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Plants

Calystegia stebbinsii - Stebbins's morning-glory (E)
Ceanothus roderickii - Pine Hill ceanothus (E)
Galium californicum ssp. sierrae - El Dorado bedstraw (E)
Senecio layneae - Layne's butterweed (=ragwort) (T)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)

Species of Concern

Invertebrates

Nebria darlingtoni - South Forks ground beetle (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Rana boylii - foothill yellow-legged frog (SC)
Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Agelaius tricolor - tricolored blackbird (SC)
Athene cunicularia hypugaea - western burrowing owl (SC)
Baeolophus inornatus - oak titmouse (SLC)
Buteo Swainsoni - Swainson's hawk (CA)
Carduelis lawrencei - Lawrence's goldfinch (SC)
Chaetura vauxi - Vaux's swift (SC)
Cypseloides niger - black swift (SC)
Elanus leucurus - white-tailed (=black shouldered) kite (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Numenius americanus - long-billed curlew (SC)
Picoides nuttallii - Nuttall's woodpecker (SLC)
Riparia riparia - bank swallow (CA)

Selasphorus rufus - rufous hummingbird (SC)
Toxostoma redivivum - California thrasher (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Perognathus inornatus - San Joaquin pocket mouse (SC)

Plants

Balsamorhiza macrolepis var macrolepis - big-scale (=California) balsamroot (SLC)
Chlorogalum grandiflorum - Red Hills soaproot (SC)
Clarkia biloba ssp brandegeae - Brandegee's clarkia (SLC)
Helianthemum suffrutescens - Amador (Bisbee Peak) rush-rose (SLC)
Wyethia reticulata - El Dorado mule-ears (SC)

ROYAL GORGE (539B)

Listed Species

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Amphibians

Rana muscosa - mountain yellow-legged frog (C)

Mammals

Martes pennanti - fisher (C)

Species of Concern

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Hydromantes platycephalus - Mount Lyell salamander (SC)

Birds

Accipiter gentilis - northern goshawk (SC)
Baeolophus inornatus - oak titmouse (SLC)
Cinclus mexicanus - American dipper (SLC)
Cypseloides niger - black swift (SC)
Falco peregrinus anatum - American peregrine falcon (D)
Histrionicus histrionicus - Harlequin duck (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Otus flammeolus - flammulated owl (SC)
Picoides albolarvatus - white-headed woodpecker (SC)
Selasphorus rufus - rufous hummingbird (SC)
Strix occidentalis occidentalis - California spotted owl (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Lepus americanus tahoensis - Sierra Nevada snowshoe hare (SC)
Martes americana - American (=pine) marten (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Vulpes vulpes necator - Sierra Nevada red fox (CA)

Plants

Phacelia stebbinsii - Stebbins' phacelia (SC)
Viola tomentosa - felt-leaved (=woolly) violet (SLC)

BUNKER HILL (539C)

Listed Species

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Amphibians

Rana muscosa - mountain yellow-legged frog (C)

Mammals

Martes pennanti - fisher (C)

Species of Concern

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Hydromantes platycephalus - Mount Lyell salamander (SC)

Birds

Accipiter gentilis - northern goshawk (SC)
Baeolophus inornatus - oak titmouse (SLC)
Cinclus mexicanus - American dipper (SLC)
Cypseloides niger - black swift (SC)
Falco peregrinus anatum - American peregrine falcon (D)
Melanerpes lewis - Lewis' woodpecker (SC)
Otus flammeolus - flammulated owl (SC)
Picoides albolarvatus - white-headed woodpecker (SC)
Selasphorus rufus - rufous hummingbird (SC)
Strix occidentalis occidentalis - California spotted owl (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Lepus americanus tahoensis - Sierra Nevada snowshoe hare (SC)
Martes americana - American (=pine) marten (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Vulpes vulpes necator - Sierra Nevada red fox (CA)

Plants

Phacelia stebbinsii - Stebbins' phacelia (SC)

WENTWORTH SPRINGS (539D)

Listed Species

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Amphibians

Rana muscosa - mountain yellow-legged frog (C)

Mammals

Martes pennanti - fisher (C)

Species of Concern

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Hydromantes platycephalus - Mount Lyell salamander (SC)

Birds

Accipiter gentilis - northern goshawk (SC)
Balaeniceps rex - shoebill (SC)
Cinclus mexicanus - American dipper (SLC)
Cypseloides niger - black swift (SC)
Falco peregrinus anatum - American peregrine falcon (D)
Melanerpes lewis - Lewis' woodpecker (SC)
Otus flammeolus - flammulated owl (SC)
Picoides albolarvatus - white-headed woodpecker (SC)
Selasphorus rufus - rufous hummingbird (SC)
Strix occidentalis occidentalis - California spotted owl (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Lepus americanus tahoensis - Sierra Nevada snowshoe hare (SC)
Martes americana - American (=pine) marten (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Vulpes vulpes necator - Sierra Nevada red fox (CA)

Plants

Phacelia stebbinsii - Stebbins' phacelia (SC)
Viola tomentosa - felt-leaved (=woolly) violet (SLC)

MICHIGAN BLUFF (540C)

Listed Species

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Mammals

Martes pennanti - fisher (C)

Species of Concern

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Hydromantes platycephalus - Mount Lyell salamander (SC)
Rana boylii - foothill yellow-legged frog (SC)

Reptiles

Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Accipiter gentilis - northern goshawk (SC)
Baeolophus inornatus - oak titmouse (SLC)
Cinclus mexicanus - American dipper (SLC)
Cypseloides niger - black swift (SC)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Otus flammeolus - flammulated owl (SC)
Picoides albolarvatus - white-headed woodpecker (SC)
Selasphorus rufus - rufous hummingbird (SC)
Strix occidentalis occidentalis - California spotted owl (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Lepus americanus tahoensis - Sierra Nevada snowshoe hare (SC)
Martes americana - American (=pine) marten (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)

Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)
Vulpes vulpes necator - Sierra Nevada red fox (CA)

Plants

Lewisia serrata - saw-toothed lewisia (SC)
Phacelia stebbinsii - Stebbins' phacelia (SC)

FORESTHILL (541D)

Listed Species

Invertebrates

Desmocerus californicus dimorphus - valley elderberry longhorn beetle (T)

Fish

Hypomesus transpacificus - delta smelt (T)
Oncorhynchus mykiss - Central Valley steelhead (T)
Oncorhynchus tshawytscha - Central Valley spring-run chinook salmon (T)
Oncorhynchus tshawytscha - winter-run chinook salmon, Sacramento River (E)

Amphibians

Rana aurora draytonii - California red-legged frog (T)

Birds

Haliaeetus leucocephalus - bald eagle (T)

Candidate Species

Fish

Oncorhynchus tshawytscha - Central Valley fall/late fall-run chinook salmon (C)

Mammals

Martes pennanti - fisher (C)

Species of Concern

Invertebrates

Goeracea oregona - Sagehen Creek goracean caddisfly (SC)
Megaleuctra sierra - Shirttail Creek stonefly (SC)

Fish

Pogonichthys macrolepidotus - Sacramento splittail (SC)
Spirinchus thaleichthys - longfin smelt (SC)

Amphibians

Rana boylii - foothill yellow-legged frog (SC)

Spea hammondii (was Scaphiopus h.) - western spadefoot toad (SC)

Reptiles

Clemmys marmorata marmorata - northwestern pond turtle (SC)
Phrynosoma coronatum frontale - California horned lizard (SC)

Birds

Accipiter gentilis - northern goshawk (SC)
Agelaius tricolor - tricolored blackbird (SC)
Baeolophus inornatus - oak titmouse (SLC)
Cinclus mexicanus - American dipper (SLC)
Cypseloides niger - black swift (SC)
Empidonax traillii brewsteri - little willow flycatcher (CA)
Falco peregrinus anatum - American peregrine falcon (D)
Lanius ludovicianus - loggerhead shrike (SC)
Melanerpes lewis - Lewis' woodpecker (SC)
Otus flammeolus - flammulated owl (SC)
Picoides albolarvatus - white-headed woodpecker (SC)
Riparia riparia - bank swallow (CA)
Selasphorus rufus - rufous hummingbird (SC)
Strix occidentalis occidentalis - California spotted owl (SC)

Mammals

Euderma maculatum - spotted bat (SC)
Eumops perotis californicus - greater western mastiff-bat (SC)
Lepus americanus tahoensis - Sierra Nevada snowshoe hare (SC)
Myotis ciliolabrum - small-footed myotis bat (SC)
Myotis evotis - long-eared myotis bat (SC)
Myotis thysanodes - fringed myotis bat (SC)
Myotis volans - long-legged myotis bat (SC)
Myotis yumanensis - Yuma myotis bat (SC)

Plants

Fritillaria eastwoodiae - Butte fritillary (SC)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed (in the Federal Register) as being in danger of extinction.
(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
(P) *Proposed* - Officially proposed (in the Federal Register) for listing as endangered or threatened.
(NMFS) Species under the Jurisdiction of the National Marine Fisheries Service. Consult with them directly about these species.
Critical Habitat - Area essential to the conservation of a species.
(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
(C) *Candidate* - Candidate to become a proposed species.
(CA) Listed by the State of California but not by the Fish & Wildlife Service.
(D) *Delisted* - Species will be monitored for 5 years.
(SC) *Species of Concern*/(SLC) Species of Local Concern - Other species of concern to the Sacramento Fish & Wildlife Office.
(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regard-less of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the quad or quads covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the nine surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

State-Listed Species

If a species has been listed as threatened or endangered by the State of California, but not by us or not by the National Marine Fisheries Service, it will appear on your list as a Species of Concern. However you should contact the California Department of Fish and Game Wildlife and Habitat Data Analysis Branch for official information about these species.

Your Responsibilities Under the Endangered Species Act

All plants and animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any such animal."

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our critical habitat page for maps.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

Your list may contain a section called Species of Concern. This is an informal term that refers to those species that the Sacramento Fish and Wildlife Office believes might be in need of concentrated conservation actions. Such conservation actions vary depending on the health of the populations and degree and types of threats. At one extreme, there may only need to be periodic monitoring of populations and threats to the species and its habitat. At the other extreme, a species may need to be listed as a Federal threatened or endangered species. Species of concern receive no legal protection and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species.

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed, candidate and special concern species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be November 08, 2005.

APPENDIX C
SACRAMENTO SUBURBAN WATER DISTRICT
LONG-TERM WARREN ACT CONTRACT
ENVIRONMENTAL ASSESSMENT

Hydrologic Modeling Analysis

PREPARED FOR:

SACRAMENTO SUBURBAN WATER DISTRICT
CLEARLY REFRESHING SERVICE!

PREPARED BY:

HDR | SWRI Surface Water Resources, Inc.

OCTOBER 2006

APPENDIX C
SACRAMENTO SUBURBAN WATER DISTRICT
LONG-TERM WARREN ACT CONTRACT
ENVIRONMENTAL ASSESSMENT
HYDROLOGIC MODELING ANALYSIS

1.0 INTRODUCTION

The following discussion provides technical information on the hydrologic modeling performed in support of the Environmental Assessment (EA) for the long-term Warren Act (WA) contract between the U.S. Bureau of Reclamation (Reclamation) and Sacramento Suburban Water District (SSWD). Under the Proposed Action, Reclamation would to convey up to 29,000 acre-feet annually (AFA) of Placer County Water Agency (PCWA) Middle Fork Project (MFP) water through the Central Valley Project (CVP) Folsom Reservoir facilities to the SSWD long-term WA service area.

As proposed, water released from MFP facilities for delivery to the SSWD service area would be diverted immediately from Folsom Reservoir upon arrival to the reservoir, effectively treating Folsom Reservoir as an open channel. Consequently, implementation of the long-term WA contract would not require re-operation of Folsom Reservoir and, therefore, would not affect CVP or State Water Project (SWP) system-wide operations (e.g., CVP and SWP reservoir storage; instream flows and water temperatures downstream of CVP and SWP reservoirs; and Sacramento-San Joaquin Delta [Delta] inflow, outflow, and exports).

Although implementation of the Proposed Action would not require re-operation of the CVP system, implementation could result in changes to MFP reservoir storage and Folsom Reservoir inflow. Water temperature in the lower American River below Folsom Reservoir and the frequency and magnitude of Folsom Reservoir spills during flood events may also be affected. As part of this analysis, various hydrologic modeling tools were utilized to quantify potential changes in the hydrologic system and to aid in the analysis of potential effects on environmental resources. The hydrologic modeling tools were utilized to simulate conditions associated with implementation of the Proposed Action for comparison to the No Action condition. In addition, a sensitivity analysis is provided to illustrate past actions and conditions (i.e., no delivery of PCWA water to SSWD) relative to the Proposed Action. The following sections provide a description of the modeling tools utilized in the hydrologic analysis, the modeling scenarios and assumptions developed to assess potential environmental effects with implementation of the Proposed Action, and the results of the comparative modeling simulations.

2.0 HYDROLOGIC MODELING TOOLS

The following three types of hydrologic modeling tools were utilized in the hydrologic analysis and are discussed in detail below:

- Output from reservoir storage and flow simulation models for the CVP/SWP system (CALSIM II) and the Middle Fork Project/Upper American River Project system (Upper American River Model);

- A reservoir storage and flow post-processing spreadsheet tool (Hydrologic Post-Processing Tool); and
- Water temperature models for lower American River water temperature (Reclamation's Water Temperature Model with ATSP; Coldwater Pool Management Model).

2.1 CALSIM II

The CALSIM model is a product of joint development between the Department of Water Resources (DWR) and Reclamation, and is their primary operations and planning model for SWP and CVP operations. The model simulates CVP and SWP system operations and the hydrologic effects of those operations within the geographical area affected by CVP and SWP facilities, including the Delta. Major Central Valley rivers, reservoirs, and CVP/SWP facilities are represented by a network of computation points or nodes. CALSIM II uses linear programming to solve sets of equations that simulate water movement through the CVP/SWP system in accordance with various objectives and constraints. CALSIM II has successfully been applied by both DWR and Reclamation to examine both structural and non-structural changes to the CVP/SWP system, as well as to ascertain the risks involved with different potential operating scenarios and to quantify the impacts of proposed projects and actions.

CALSIM II uses a mass balance approach to simulate the occurrence, regulation, and movement of water from one river reach (computation point or node) to another. At each node, various physical processes (e.g., surface water inflow or accretion, flow from another node, groundwater accretion or depletion, and diversion) can be simulated or assumed. Operational constraints, such as reservoir size and seasonal storage limits or minimum flow requirements, also are defined for each node. The model uses a monthly time step over the 73-year period-of-record from October 1921 to September 1994. Accordingly, flows are specified as a mean flow for the month in cubic feet per second (cfs), and reservoir storage volumes are specified as end-of-month content in thousand acre-feet (TAF).

Detailed CALSIM II documentation is publicly available from the DWR, Bay-Delta Office, Modeling Support Branch website located at: http://modeling.water.ca.gov/.

2.2 UPPER AMERICAN RIVER MODEL

The Upper American River Model (UARM) simulates the American River system upstream of Folsom Reservoir by combining use of the U.S. Army Corps of Engineers' (Corps) HEC-III program for hydrologic routing and storage accounting purposes with a spreadsheet model that simulates operations of the MFP.

The UARM developed by DWR is described in the Central District Memorandum Report, *American River Watershed Model*, March 1984. Modifications to the model structure and input data have been subsequently made in order to implement minimum storage requirements, minimum flow requirements, water rights related diversions, and certain storage operations. These modifications involve the Middle Fork of the American River, the Rubicon River, and PCWA's MFP facilities. Modifications to diversions involve PCWA and Georgetown Divide Public Utilities District (GDPUD) at the Auburn Dam site and at Pilot Creek. The spreadsheet model is documented in *Upper American River Model: Analysis of Placer County Water Agency's Middle Fork Project*, prepared for Reclamation and DWR by Surface Water Resources, Inc., March 31, 2000.

The UARM produces a time series of monthly flows into Folsom Reservoir and a time series of storage data for calculating "creditable" upstream storage space which influences flood control storage requirements at Folsom Reservoir.

2.3 HYDROLOGIC POST-PROCESSING TOOL

The Hydrologic Post-Processing Tool determines changes in reservoir storage and instream flows with implementation of a proposed action or project relative to baseline conditions. Output from CALSIM II and the UARM are used as input to the Hydrologic Post-Processing Tool to first determine reservoir storage and instream flow conditions without the proposed action or project. Monthly patterns of reservoir releases and diversions associated with the proposed action or project are then applied to identify changes in MFP reservoir (i.e., French Meadows Reservoir and Hell Hole Reservoir) storage and spill; instream flows in the Middle Fork American River below Ralston Afterbay; and Folsom Reservoir inflow, storage, and release. Maximum reservoir storage, minimum instream flows, and downstream diversion requirements are accounted for in the calculation process. Releases from French Meadows and Hell Hole reservoirs are made primarily through tunnels that outlet to Ralston Forebay for power generation, therefore, non-flood flows immediately downstream of these reservoirs would not change. Output from the Hydrologic Post-Processing Tool includes monthly changes to French Meadows, Hell Hole and Folsom reservoir storages, flow below Ralston Afterbay, inflow to Folsom Reservoir, and Folsom Reservoir release.

2.4 RECLAMATION'S WATER TEMPERATURE MODELS WITH ATSP

2.4.1 Reservoir and River Water Temperature Models

Reclamation has developed a water temperature model for the lower American river that has both a reservoir and river component to simulate water temperatures. Detailed information regarding Reclamation's water temperature models is documented in the Central Valley Project Improvement Act (CVPIA) Draft Programmatic Environmental Impact Statement (PEIS) Technical Appendix, Volume Nine. These temperature models also are documented in *U.S. Bureau of Reclamation Monthly Temperature Model Sacramento River Basin, June 1990*.

2.4.2 Automated Temperature Selection Procedure

The Reclamation lower American River water temperature models are utilized in an iterative manner referred to as the "Automated Temperature Selection Procedure" (ATSP). This procedure operates the reservoir and river models with the objective of achieving monthly target water temperatures in the lower American River at Watt Avenue. Water temperature targets are achieved through choice of reservoir level from which the release is drawn.

A schedule of 12 water temperatures, one for each month of the year, is specified as the preferred schedule of monthly water temperature targets. Each year of the simulation, the model attempts to meet the preferred schedule of water temperatures. If the preferred schedule cannot be met, the procedure cycles to a second, slightly less preferable schedule of water temperatures. If the second schedule cannot be met, the procedure continues through a series of schedules, arranged by declining preference, until a schedule of water temperature targets is met for that year. Specification of the schedules and prioritization of schedules enables the model user to regulate management of the Folsom Reservoir coldwater pool for a desired water

temperature regime in the river. The ATSP is described in detail in the *ATSP Users Guide* prepared for Reclamation by SWRI in May 2000.

2.5 COLDWATER POOL MANAGEMENT MODEL

The Coldwater Pool Management Model (CPMM) is used to select the most beneficial seasonal target water temperature objectives for the lower American River during a given year, as well as the operation plan to obtain the selected water temperatures. Selection of seasonal water temperatures is characterized by the rate and duration with which cold water must be released from Folsom Reservoir to control river temperatures, based on the biological benefit expected from controlling water temperature in the lower American River, and limited by the amount of cold water available in Folsom Reservoir.

As input, the CPMM requires initial reservoir conditions (i.e., profiles of water temperature, total dissolved solids, and suspended solids), hydrologic time series data for the North and South Forks of the American River inflow to Folsom Reservoir (i.e., flow rate, water temperature, total dissolved solids, and suspended solid concentrations), reservoir evaporation and river heat gain, meteorological data (i.e., air temperature, relative humidity, air pressure, cloud cover, and wind speed), and Folsom reservoir operations data (i.e., release and diversion operations).

Output from the CPMM includes weekly Folsom Reservoir releases, selected target water temperature objectives, and lower American River water temperatures at Nimbus Dam and Watt Avenue for the selected year.

3.0 HYDROLOGIC MODELING SCENARIOS

Two hydrologic modeling scenarios were initially developed to identify and quantify hydrologic-related conditions with and without the Proposed Action. In addition, a third modeling scenario was developed at Reclamation's request to illustrate past actions and conditions (i.e., no delivery of PCWA water to SSWD) relative to the Proposed Action. The modeling scenarios included in the hydrologic analysis are as follows:

1. **No Action**: Under the No Action scenario, Reclamation would convey up to 10,000 AFA of PCWA MFP water through Folsom Reservoir and the federal facilities at Folsom Dam to the SSWD long-term WA service area during "above Hodge" years (i.e., those years when the March through November unimpaired inflow exceeds 1,600,000 AF). This scenario is based on a future level of water supply demand and land use development projected for the year 2020.

2. **Proposed Action**: Under the Proposed Action scenario, Reclamation would convey up to 29,000 AFA of PCWA MFP water through Folsom Reservoir and the federal facilities at Folsom Dam to the SSWD long-term WA service area during "above Hodge" years (i.e., those years when the March through November unimpaired inflow exceeds 1,600,000 AF). This scenario is based on a future level of water supply demand and land use development projected for the year 2020.

3. **No Water Delivery**: Under the No Water Delivery scenario, no conveyance of PCWA MFP water through Folsom Reservoir and the federal facilities at Folsom Dam to the SSWD long-term WA service area would occur.

Development of the No Water Delivery scenario allows a sensitivity analysis to be performed through a comparison of the differences between the "Proposed Action vs. No Action" modeling results and the "Proposed Action vs. No Water Delivery" modeling results.

The monthly pattern of release from MFP facilities and diversion from Folsom Reservoir incorporated into the Proposed Action scenario is presented in **Table C-1**.

Table C-1. SSWD forecasted monthly demand schedule (AF/month).

Month	% of Annual Demand	2006	2010	2014	2020	2023	2030
Jan	5.0	1,304	1,349	1,366	1,392	1,405	1,448
Feb	4.6	1,199	1,241	1,257	1,280	1,292	1,332
Mar	5.2	1,356	1,403	1,420	1,447	1,461	1,506
Apr	7.0	1,825	1,888	1,912	1,948	1,966	2,027
May	10.0	2,607	2,697	2,732	2,783	2,809	2,895
Jun	11.5	2,998	3,102	3,141	3,201	3,231	3,330
Jul	13.3	3,468	3,587	3,633	3,702	3,736	3,851
Aug	13.4	3,494	3,614	3,660	3,730	3,764	3,880
Sept	11.0	2,868	2,967	3,005	3,062	3,090	3,185
Oct	8.1	2,112	2,185	2,213	2,255	2,275	2,345
Nov	5.7	1,486	1,537	1,557	1,587	1,601	1,650
Dec	5.2	1,356	1,403	1,420	1,447	1,461	1,506
Total	100.0	26,072	26,971	27,315	27,833	28,091	28,953

Source: HYA 1998 as cited in (PCWA and NWD 1998)

4.0 HYDROLOGIC MODELING ASSUMPTIONS

4.1 MIDDLE FORK PROJECT AND FOLSOM RESERVOIR OPERATIONS

Changes in reservoir storage, spill, and instream flow with implementation of the Proposed Action relative to the No Action and No Water Delivery conditions were simulated using the Hydrologic Post-Processing Tool. The Hydrologic Post-Processing Tool applied the Proposed Action demand to MFP and Folsom Reservoir operations under the No Action and No Water Delivery conditions to simulate conditions with implementation of the Proposed Action.

The No Action and No Water Delivery conditions represent future hydrologic conditions that are expected to exist within the MFP and CVP/SWP systems prior to implementation of the Proposed Action. These conditions assume projected levels of demand and land use development for the year 2020.

An available CALSIM II simulation (OCAP Future SDIP 020204) was used to represent Folsom Reservoir storage, inflow, diversion, and release, as well as downstream diversion requirements and Delta surplus outflow under the No Action and No Water Delivery conditions. The CALSIM II simulation utilized the wrapper representing Water Rights Decision-1485 (D-1485) through South Delta Improvement Project (SDIP) regulatory constraints. A complete description of the CALSIM II study (OCAP Future SDIP 020204) used in the analysis is available

on Reclamation's Central Valley Operations Office website located at: http://www.usbr.gov/mp/cvo/ocap.html.

French Meadows Reservoir storage and spill, Hell Hole Reservoir storage and spill, and Middle Fork American River flows below Ralston Afterbay under the No Action and No Water Delivery conditions were simulated using the UARM and used as input to the Hydrologic Post-Processing Tool. The UARM assumed hydrology and lower American River demands consistent with the No Action CALSIM II simulation. Assumptions used in the UARM are described in detail in *Upper American River Model: Analysis of Placer County Water Agency's Middle Fork Project*, prepared for Reclamation and DWR by SWRI, March 31, 2000.

A 73-year simulation period, from October 1921 through September 1994, was used for the CALSIM II and UARM simulations.

4.2 WATER TEMPERATURE

Changes in water temperature in Folsom Reservoir and the lower American River were modeled using Reclamation's water temperature models with ATSP and the CPMM. CALSIM II simulation results described in Section 4.1 for the No Action and No Water Delivery conditions were used as input to the water temperature models. Output from Reclamation's water temperature model with ATSP included the final monthly water temperature target schedule met for each year of simulation. The water temperature target schedule for one year of interest (refer to Section 5.4 for further details) was used as input into the CPMM, which output weekly water temperatures achieved in the lower American River.

A monthly 72-year period, from January 1922 through December 1993, was used for the Reclamation's water temperature with ATSP simulations. A weekly one-year period was used for the CPMM simulation.

5.0 HYDROLOGIC MODELING FRAMEWORK AND RESULTS

5.1 MIDDLE FORK PROJECT RESERVOIR STORAGE AND INSTREAM FLOWS

Implementation of the Proposed Action requires that the increased SSWD demand for MFP water be met by MFP storage releases. Storage releases would be made on the SSWD demand pattern depicted in **Error! Reference source not found.**. For analysis purposes, French Meadows and Hell Hole reservoirs were assumed to share the obligation to meet the demand equally when possible. For power generation purposes, releases from French Meadows and Hell Hole reservoirs are made through tunnels ending at Ralston Forebay. Therefore, although MFP reservoir storages would change with implementation of the Proposed Action, instream flows in the Middle Fork American River directly below French Meadows Reservoir and in the Rubicon River below Hell Hole Reservoir would not change. The only instream flows in the MFP system that could be affected by implementation of the Proposed Action would be flows in the Middle Fork American River downstream of Ralston Afterbay.

Increased MFP reservoir releases required to meet the SSWD demand associated with the Proposed Action would result in lower reservoir storage (reservoir storage debt) and higher flows downstream of Ralston Afterbay under the Proposed Action, relative to the No Action and No Water Delivery conditions. As part of the hydrologic analysis it is assumed that once

adequate inflow to the MFP reservoirs occurs to fill the reservoirs under the No Action and No Water Delivery conditions, the additional inflow that would be spilled from the MFP reservoirs under the No Action and No Water Delivery conditions would be used to refill the reservoir storage debt under the Proposed Action condition. When refill of the reservoir storage debt occurs, flows downstream of Ralston Afterbay would decrease. However, these decreases would be of relatively small magnitude because they would occur during times of high inflow. It is assumed that refill of the reservoir storage debt would generally take place simultaneously in the MFP reservoirs. When conditions suggest that the MFP reservoirs are nearly full, preference is given to refilling French Meadows Reservoir.

Changes in French Meadows Reservoir storage and surface water elevation, with implementation of the Proposed Action relative to the No Action condition, are provided in **Table C-2** and **Table C-3**. During those years of project operation, average end-of-month storage in French Meadows Reservoir would be reduced by up to 1 percent in May, July, and August under the Proposed Action, relative to the No Action condition. During wet, above normal, below normal, and dry water years, average end-of-month storage would decrease by up to 3 percent. Decreases in storage of up to 10 percent would occur in October, November, and December during critical water years with implementation of the Proposed Action, relative to the No Action condition.

With implementation of the Proposed Action, modeled long-term end-of-month surface elevations in French Meadows Reservoir were essentially equivalent (i.e., ≤ 1ft. change) to surface elevations under the No Action condition during May through June, during those years of project operation. During wet, above normal, below normal, and dry water years, modeled end-of-month surface elevations under the Proposed Action, relative to the No Action condition, would decrease by up to 3 feet during October through January. Decreases in end-of-month surface elevations of up to 6 feet would occur in September during critical water years with implementation of the Proposed Action, relative to the No Action condition.

Changes in French Meadows Reservoir storage and surface water elevation, with implementation of the Proposed Action relative to the No Water Delivery condition, are provided in **Table C-4** and **Table C-5**. Relative to the "Proposed Action vs. No Action" modeling results, average end-of-month storage would decrease by up to 1 percent in June during critical water years and average end-of-month surface elevations would not change under the "Proposed Action vs. No Water Delivery" condition.

Table C-2. Long-term average French Meadows Reservoir storage, and average storage by water year type, under No Action and Proposed Action conditions.

Analysis Period	End-of-Month Storage (TAF)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	59	60	63	69	76	87	105	124	122	102	81	66
Proposed Action	58	59	62	68	75	86	104	123	121	101	80	65
Difference	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Percent Difference[c]	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1	-1	-2
Project Operation[d]												
No Action	63	63	63	70	75	94	113	134	133	115	92	72
Proposed Action	64	64	64	71	76	94	113	133	133	114	91	73
Difference	1	1	1	1	1	0	0	-1	0	-1	-1	1
Percent Difference	2	2	2	1	1	0	0	-1	0	-1	-1	1
Water Year Types[e]												
Wet												
No Action	63	63	63	84	95	104	117	135	134	117	93	73
Proposed Action	64	64	64	85	96	105	118	135	134	117	93	75
Difference	1	1	1	1	1	1	1	0	0	0	0	2
Percent Difference	2	2	2	1	1	1	1	0	0	0	0	3
Above Normal												
No Action	64	62	62	75	81	99	116	132	130	111	89	72
Proposed Action	62	61	60	73	79	97	116	131	129	109	87	70
Difference	-2	-1	-2	-2	-2	-2	0	-1	-1	-2	-2	-2
Percent Difference	-3	-2	-3	-3	-2	-2	0	-1	-1	-2	-2	-3
Below Normal												
No Action	59	62	65	63	69	79	106	130	129	107	83	65
Proposed Action	60	62	65	62	68	78	105	130	129	107	83	66
Difference	1	0	0	-1	-1	-1	-1	0	0	0	0	1
Percent Difference	2	0	0	-2	-1	-1	-1	0	0	0	0	2
Dry												
No Action	58	60	68	59	63	75	99	121	119	96	74	61
Proposed Action	56	59	67	58	63	75	98	120	118	95	73	60
Difference	-2	-1	-1	-1	0	0	-1	-1	-1	-1	-1	-1
Percent Difference	-3	-2	-1	-2	0	0	-1	-1	-1	-1	-1	-2
Critical												
No Action	48	49	52	61	63	71	82	94	90	72	60	53
Proposed Action	43	44	47	57	60	68	79	90	86	68	56	49
Difference	-5	-5	-5	-4	-3	-3	-3	-4	-4	-4	-4	-4
Percent Difference	-10	-10	-10	-7	-5	-4	-4	-4	-4	-6	-7	-8

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-3. Long-term average French Meadows Reservoir surface water elevation, and average elevation by water year type, under No Action and Proposed Action conditions.

Analysis Period	End-of-Month Elevation (feet msl)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	5,196	5,197	5,200	5,206	5,212	5,222	5,237	5,251	5,250	5,235	5,217	5,203
Proposed Action	5,195	5,196	5,198	5,205	5,211	5,221	5,237	5,251	5,249	5,234	5,216	5,202
Difference	-1	-1	-2	-1	-1	-1	0	0	-1	-1	-1	-1
Project Operation[c]												
No Action	5,201	5,200	5,201	5,207	5,212	5,229	5,244	5,259	5,259	5,245	5,227	5,210
Proposed Action	5,202	5,201	5,202	5,208	5,213	5,228	5,243	5,258	5,258	5,245	5,227	5,210
Difference	1	1	1	1	1	-1	-1	-1	-1	0	0	0
Water Year Types[d]												
Wet												
No Action	5,199	5,201	5,207	5,220	5,229	5,236	5,247	5,260	5,259	5,247	5,229	5,211
Proposed Action	5,199	5,201	5,208	5,221	5,229	5,237	5,247	5,260	5,259	5,247	5,229	5,213
Difference	0	0	1	1	0	1	0	0	0	0	0	2
Above Normal												
No Action	5,192	5,196	5,200	5,211	5,216	5,233	5,246	5,257	5,256	5,242	5,224	5,208
Proposed Action	5,189	5,193	5,197	5,208	5,214	5,231	5,246	5,257	5,255	5,241	5,223	5,207
Difference	-3	-3	-3	-3	-2	-2	0	0	-1	-1	-1	-1
Below Normal												
No Action	5,197	5,197	5,197	5,201	5,207	5,216	5,238	5,256	5,255	5,239	5,220	5,203
Proposed Action	5,196	5,195	5,195	5,199	5,205	5,215	5,237	5,256	5,256	5,240	5,220	5,204
Difference	-1	-2	-2	-2	-2	-1	-1	0	1	1	0	1
Dry												
No Action	5,193	5,193	5,194	5,196	5,201	5,213	5,233	5,250	5,248	5,230	5,211	5,199
Proposed Action	5,192	5,193	5,193	5,195	5,200	5,212	5,232	5,249	5,247	5,229	5,210	5,197
Difference	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2
Critical												
No Action	5,198	5,197	5,197	5,198	5,201	5,208	5,218	5,228	5,224	5,208	5,196	5,189
Proposed Action	5,195	5,193	5,193	5,194	5,197	5,205	5,215	5,225	5,221	5,205	5,191	5,183
Difference	-3	-4	-4	-4	-4	-3	-3	-3	-3	-3	-5	-6

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[d] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-4. Long-term average French Meadows Reservoir storage, and average storage by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	End-of-Month Storage (TAF)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	59	60	63	69	76	87	105	124	122	102	81	66
Proposed Action	58	59	62	68	75	86	104	123	121	101	80	65
Difference	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Percent Difference[c]	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1	-1	-2
Project Operation[d]												
No Water Delivery	63	63	63	70	75	94	113	134	133	115	92	72
Proposed Action	64	64	64	71	76	94	113	133	133	114	91	73
Difference	1	1	1	1	1	0	0	-1	0	-1	-1	1
Percent Difference	2	2	2	1	1	0	0	-1	0	-1	-1	1
Water Year Types[e]												
Wet												
No Water Delivery	63	63	63	84	95	104	117	135	134	117	93	73
Proposed Action	64	64	64	85	96	105	118	135	134	117	93	75
Difference	1	1	1	1	1	1	1	0	0	0	0	2
Percent Difference	2	2	2	1	1	1	1	0	0	0	0	3
Above Normal												
No Water Delivery	64	62	62	75	81	99	116	132	130	111	89	72
Proposed Action	62	61	60	73	79	97	116	131	129	109	87	70
Difference	-2	-1	-2	-2	-2	-2	0	-1	-1	-2	-2	-2
Percent Difference	-3	-2	-3	-3	-2	-2	0	-1	-1	-2	-2	-3
Below Normal												
No Water Delivery	59	62	65	63	69	79	106	130	129	107	83	65
Proposed Action	60	62	65	62	68	78	105	130	129	107	83	66
Difference	1	0	0	-1	-1	-1	-1	0	0	0	0	1
Percent Difference	2	0	0	-2	-1	-1	-1	0	0	0	0	2
Dry												
No Water Delivery	58	60	68	59	63	75	99	121	119	96	74	61
Proposed Action	56	59	67	58	63	75	98	120	118	95	73	60
Difference	-2	-1	-1	-1	0	0	-1	-1	-1	-1	-1	-1
Percent Difference	-3	-2	-1	-2	0	0	-1	-1	-1	-1	-1	-2
Critical												
No Water Delivery	48	49	52	61	63	71	82	94	89	72	60	53
Proposed Action	43	44	47	57	60	68	79	90	86	68	56	49
Difference	-5	-5	-5	-4	-3	-3	-3	-4	-3	-4	-4	-4
Percent Difference	-10	-10	-10	-7	-5	-4	-4	-4	-3	-6	-7	-8

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-5. Long-term average French Meadows Reservoir surface water elevation, and average elevation by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	End-of-Month Elevation (feet msl)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	5,196	5,197	5,200	5,206	5,212	5,222	5,237	5,251	5,250	5,235	5,217	5,203
Proposed Action	5,195	5,196	5,198	5,205	5,211	5,221	5,237	5,251	5,249	5,234	5,216	5,202
Difference	-1	-1	-2	-1	-1	-1	0	0	-1	-1	-1	-1
Project Operation[c]												
No Action	5,201	5,200	5,201	5,207	5,212	5,229	5,244	5,259	5,259	5,245	5,227	5,210
Proposed Action	5,202	5,201	5,202	5,208	5,213	5,228	5,243	5,258	5,258	5,245	5,227	5,210
Difference	1	1	1	1	1	-1	-1	-1	-1	0	0	0
Water Year Types[d]												
Wet												
No Water Delivery	5,199	5,201	5,207	5,220	5,229	5,236	5,247	5,260	5,259	5,247	5,229	5,211
Proposed Action	5,199	5,201	5,208	5,221	5,229	5,237	5,247	5,260	5,259	5,247	5,229	5,213
Difference	0	0	1	1	0	1	0	0	0	0	0	2
Above Normal												
No Water Delivery	5,192	5,196	5,200	5,211	5,216	5,233	5,246	5,257	5,256	5,242	5,224	5,208
Proposed Action	5,189	5,193	5,197	5,208	5,214	5,231	5,246	5,257	5,255	5,241	5,223	5,207
Difference	-3	-3	-3	-3	-2	-2	0	0	-1	-1	-1	-1
Below Normal												
No Water Delivery	5,197	5,197	5,197	5,201	5,207	5,216	5,238	5,256	5,255	5,239	5,220	5,203
Proposed Action	5,196	5,195	5,195	5,199	5,205	5,215	5,237	5,256	5,256	5,240	5,220	5,204
Difference	-1	-2	-2	-2	-2	-1	-1	0	1	1	0	1
Dry												
No Water Delivery	5,193	5,193	5,194	5,196	5,201	5,213	5,233	5,250	5,248	5,230	5,211	5,199
Proposed Action	5,192	5,193	5,193	5,195	5,200	5,212	5,232	5,249	5,247	5,229	5,210	5,197
Difference	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2
Critical												
No Water Delivery	5,198	5,197	5,197	5,198	5,201	5,208	5,218	5,228	5,224	5,208	5,196	5,189
Proposed Action	5,195	5,193	5,193	5,194	5,197	5,205	5,215	5,225	5,221	5,205	5,191	5,183
Difference	-3	-4	-4	-4	-4	-3	-3	-3	-3	-3	-5	-6

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[d] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Changes in Hell Hole Reservoir storage and surface water elevation, with implementation of the Proposed Action relative to the No Action condition, are provided in **Table C-6** and **Table C-7**. During those years of project operation, decreases in average end-of-month storage in Hell Hole Reservoir would range from 2 percent in May and June, to up to 7 percent in March and April, under the Proposed Action, relative to the No Action condition. During wet, above normal, below normal, and dry water years, average end-of-month storage would decrease by up to 13 percent in January and February during below normal years. Decreases in storage of up to 29 percent would occur in December during critical water years with implementation of the Proposed Action, relative to the No Action condition.

With implementation of the Proposed Action, modeled long-term end-of-month surface elevations in Hell Hole Reservoir would decrease by up to 16 feet relative to the No Action

condition in December and January, during those years of project operation. During wet, above normal, below normal, and dry water years, modeled end-of-month surface elevations under the Proposed Action, relative to the No Action condition, would decrease by up to 20 feet during February. Decreases in end-of-month surface elevations of up to 31 feet would occur in January and February during critical water years with implementation of the Proposed Action, relative to the No Action condition.

Table C-6. Long-term average Hell Hole Reservoir storage, and average storage by water year type, under No Action and Proposed Action conditions.

Analysis Period	End-of-Month Storage (TAF)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	103	95	93	100	109	124	152	182	181	162	140	120
Proposed Action	94	85	83	90	98	113	141	174	173	153	130	111
Difference	-9	-10	-10	-10	-11	-11	-11	-8	-8	-9	-10	-9
Percent Difference[c]	-9	-11	-11	-10	-10	-9	-7	-4	-4	-6	-7	-8
Project Operation[d]												
No Action	115	102	97	105	112	135	167	204	206	188	161	136
Proposed Action	111	98	93	100	107	125	156	199	202	182	153	129
Difference	-4	-4	-4	-5	-5	-10	-11	-5	-4	-6	-8	-7
Percent Difference	-3	-4	-4	-5	-4	-7	-7	-2	-2	-3	-5	-5
Water Year Types[e]												
Wet												
No Action	115	102	97	120	134	149	175	207	208	191	164	139
Proposed Action	111	98	93	114	127	141	168	205	207	188	159	136
Difference	-4	-4	-4	-6	-7	-8	-7	-2	-1	-3	-5	-3
Percent Difference	-3	-4	-4	-5	-5	-5	-4	-1	0	-2	-3	-2
Above Normal												
No Action	108	97	91	105	113	138	166	201	202	180	154	130
Proposed Action	101	89	83	100	108	132	161	199	200	175	147	123
Difference	-7	-8	-8	-5	-5	-6	-5	-2	-2	-5	-7	-7
Percent Difference	-6	-8	-9	-5	-4	-4	-3	-1	-1	-3	-5	-5
Below Normal												
No Action	106	100	101	97	106	121	158	196	197	174	149	127
Proposed Action	95	89	90	84	92	107	144	187	189	165	139	117
Difference	-11	-11	-11	-13	-14	-14	-14	-9	-8	-9	-10	-10
Percent Difference	-10	-11	-11	-13	-13	-12	-9	-5	-4	-5	-7	-8
Dry												
No Action	104	97	102	86	93	109	141	172	167	149	132	118
Proposed Action	92	85	90	77	83	99	131	163	157	138	120	106
Difference	-12	-12	-12	-9	-10	-10	-10	-9	-10	-11	-12	-12
Percent Difference	-12	-12	-12	-10	-11	-9	-7	-5	-6	-7	-9	-10
Critical												
No Action	73	69	66	84	87	94	108	120	114	99	88	77
Proposed Action	53	50	47	65	67	74	88	100	94	79	69	58
Difference	-20	-19	-19	-19	-20	-20	-20	-20	-20	-20	-19	-19
Percent Difference	-27	-28	-29	-23	-23	-21	-19	-17	-18	-20	-22	-25

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-7. Long-term average Hell Hole Reservoir surface water elevation, and average elevation by water year type, under No Action and Proposed Action conditions.

Analysis Period	End-of-Month Elevation (feet msl)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	4,531	4,520	4,517	4,527	4,538	4,558	4,591	4,626	4,624	4,602	4,576	4,552
Proposed Action	4,517	4,505	4,501	4,511	4,523	4,543	4,578	4,617	4,615	4,591	4,564	4,540
Difference	-14	-15	-16	-16	-15	-15	-13	-9	-9	-11	-12	-12
Project Operation[c]												
No Action	4,531	4,520	4,517	4,527	4,538	4,558	4,591	4,626	4,624	4,602	4,576	4,552
Proposed Action	4,517	4,505	4,501	4,511	4,523	4,543	4,578	4,617	4,615	4,591	4,564	4,540
Difference	-14	-15	-16	-16	-15	-15	-13	-9	-9	-11	-12	-12
Water Year Types[d]												
Wet												
No Action	4,539	4,530	4,536	4,554	4,570	4,588	4,618	4,655	4,656	4,636	4,606	4,577
Proposed Action	4,530	4,520	4,527	4,545	4,562	4,579	4,610	4,653	4,656	4,633	4,600	4,573
Difference	-9	-10	-9	-9	-8	-9	-8	-2	0	-3	-6	-4
Above Normal												
No Action	4,513	4,510	4,510	4,530	4,543	4,575	4,608	4,649	4,649	4,623	4,594	4,566
Proposed Action	4,507	4,504	4,503	4,523	4,536	4,568	4,602	4,646	4,647	4,618	4,586	4,557
Difference	-6	-6	-7	-7	-7	-7	-6	-3	-2	-5	-8	-9
Below Normal												
No Action	4,543	4,523	4,515	4,523	4,536	4,555	4,599	4,642	4,644	4,616	4,589	4,563
Proposed Action	4,526	4,505	4,496	4,504	4,516	4,536	4,582	4,633	4,635	4,606	4,576	4,550
Difference	-17	-18	-19	-19	-20	-19	-17	-9	-9	-10	-13	-13
Dry												
No Action	4,525	4,513	4,506	4,508	4,518	4,540	4,579	4,615	4,610	4,588	4,568	4,551
Proposed Action	4,512	4,499	4,491	4,493	4,503	4,527	4,567	4,604	4,598	4,576	4,554	4,536
Difference	-13	-14	-15	-15	-15	-13	-12	-11	-12	-12	-14	-15
Critical												
No Action	4,529	4,514	4,505	4,505	4,509	4,519	4,537	4,551	4,543	4,524	4,506	4,489
Proposed Action	4,502	4,485	4,475	4,474	4,478	4,489	4,510	4,525	4,517	4,496	4,479	4,460
Difference	-27	-29	-30	-31	-31	-30	-27	-26	-26	-28	-27	-29

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[d] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Changes in Hell Hole Reservoir storage and surface water elevation, with implementation of the Proposed Action relative to the No Water Delivery condition, are provided in **Table C-8** and **Table C-9**. Relative to the "Proposed Action vs. No Action" modeling results, average end-of-month storage would increase by up to 1 percent in February during those years of project operation, in April during above normal years, in January, April, May, and June during dry years, and in January, February, March, and July during critical water years. Relative to the "Proposed Action vs. No Action" modeling results, and average end-of-month surface elevations would increase by 1 to 9 feet in all months except April during those years of project operation, and by up to 1 foot in April during wet years, January during above normal years, January, May, and July during below normal years, January, March, April, and May during dry years, and November though June during critical water years under the "Proposed Action vs. No Water Delivery" condition.

Table C-8. Long-term average Hell Hole Reservoir storage, and average storage by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	End-of-Month Storage (TAF)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	103	95	93	101	109	125	153	182	181	162	140	120
Proposed Action	94	85	83	90	98	113	141	174	173	153	130	111
Difference	-9	-10	-10	-11	-11	-12	-12	-8	-8	-9	-10	-9
Percent Difference[c]	-9	-11	-11	-11	-10	-10	-8	-4	-4	-6	-7	-8
Project Operation[d]												
No Water Delivery	115	102	97	105	113	135	167	204	206	188	161	136
Proposed Action	111	98	93	100	107	125	156	199	202	182	153	129
Difference	-4	-4	-4	-5	-6	-10	-11	-5	-4	-6	-8	-7
Percent Difference	-3	-4	-4	-5	-5	-7	-7	-2	-2	-3	-5	-5
Water Year Types[e]												
Wet												
No Water Delivery	115	102	97	120	134	149	175	207	208	191	164	139
Proposed Action	111	98	93	114	127	141	168	205	207	188	159	136
Difference	-4	-4	-4	-6	-7	-8	-7	-2	-1	-3	-5	-3
Percent Difference	-3	-4	-4	-5	-5	-5	-4	-1	0	-2	-3	-2
Above Normal												
No Water Delivery	108	97	91	105	113	138	167	201	202	180	154	130
Proposed Action	101	89	83	100	108	132	161	199	200	175	147	123
Difference	-7	-8	-8	-5	-5	-6	-6	-2	-2	-5	-7	-7
Percent Difference	-6	-8	-9	-5	-4	-4	-4	-1	-1	-3	-5	-5
Below Normal												
No Water Delivery	106	100	101	97	106	121	159	196	197	174	149	127
Proposed Action	95	89	90	84	92	107	144	187	189	165	139	117
Difference	-11	-11	-11	-13	-14	-14	-15	-9	-8	-9	-10	-10
Percent Difference	-10	-11	-11	-13	-13	-12	-9	-5	-4	-5	-7	-8
Dry												
No Water Delivery	104	97	102	87	93	109	142	173	168	149	132	118
Proposed Action	92	85	90	77	83	99	131	163	157	138	120	106
Difference	-12	-12	-12	-10	-10	-10	-11	-10	-11	-11	-12	-12
Percent Difference	-12	-12	-12	-11	-11	-9	-8	-6	-7	-7	-9	-10
Critical												
No Water Delivery	73	69	66	85	88	95	109	120	115	100	88	77
Proposed Action	53	50	47	65	67	74	88	100	94	79	69	58
Difference	-20	-19	-19	-20	-21	-21	-21	-20	-21	-21	-19	-19
Percent Difference	-27	-28	-29	-24	-24	-22	-19	-17	-18	-21	-22	-25

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-9. Long-term average Hell Hole Reservoir surface water elevation, and average elevation by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	End-of-Month Elevation (feet msl)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	4,531	4,520	4,517	4,527	4,539	4,558	4,592	4,626	4,624	4,602	4,576	4,553
Proposed Action	4,517	4,505	4,501	4,511	4,523	4,543	4,578	4,617	4,615	4,591	4,564	4,540
Difference	-14	-15	-16	-16	-16	-15	-14	-9	-9	-11	-12	-13
Project Operation[c]												
No Water Delivery	4,548	4,531	4,524	4,534	4,544	4,572	4,609	4,652	4,654	4,633	4,603	4,574
Proposed Action	4,543	4,525	4,517	4,527	4,536	4,558	4,596	4,646	4,650	4,626	4,593	4,565
Difference	-5	-6	-7	-7	-8	-14	-13	-6	-4	-7	-10	-9
Water Year Types[d]												
Wet												
No Water Delivery	4,539	4,530	4,536	4,554	4,570	4,588	4,619	4,655	4,656	4,636	4,606	4,577
Proposed Action	4,530	4,520	4,527	4,545	4,562	4,579	4,610	4,653	4,656	4,633	4,600	4,573
Difference	-9	-10	-9	-9	-8	-9	-9	-2	0	-3	-6	-4
Above Normal												
No Water Delivery	4,513	4,510	4,510	4,531	4,543	4,575	4,608	4,649	4,649	4,623	4,594	4,566
Proposed Action	4,507	4,504	4,503	4,523	4,536	4,568	4,602	4,646	4,647	4,618	4,586	4,557
Difference	-6	-6	-7	-8	-7	-7	-6	-3	-2	-5	-8	-9
Below Normal												
No Water Delivery	4,543	4,523	4,515	4,524	4,536	4,555	4,599	4,643	4,644	4,617	4,589	4,563
Proposed Action	4,526	4,505	4,496	4,504	4,516	4,536	4,582	4,633	4,635	4,606	4,576	4,550
Difference	-17	-18	-19	-20	-20	-19	-17	-10	-9	-11	-13	-13
Dry												
No Water Delivery	4,525	4,513	4,506	4,509	4,518	4,541	4,580	4,616	4,610	4,588	4,568	4,551
Proposed Action	4,512	4,499	4,491	4,493	4,503	4,527	4,567	4,604	4,598	4,576	4,554	4,536
Difference	-13	-14	-15	-16	-15	-14	-13	-12	-12	-12	-14	-15
Critical												
No Water Delivery	4,529	4,515	4,506	4,506	4,510	4,520	4,538	4,552	4,544	4,524	4,506	4,489
Proposed Action	4,502	4,485	4,475	4,474	4,478	4,489	4,510	4,525	4,517	4,496	4,479	4,460
Difference	-27	-30	-31	-32	-32	-31	-28	-27	-27	-28	-27	-29

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[d] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Changes in Middle Fork American River flows downstream of Ralston Afterbay are provided in **Table C-10,** with implementation of the Proposed Action, relative to the No Action condition. During those years of project operation, flow would be reduced by up to 4 percent in May and September under the Proposed Action, relative to the No Action condition. Increases in flow would range from 1 percent in December through March to 4 percent in July and August under the Proposed Action, relative to the No Action condition.

Hydrologic conditions under the Proposed Action during critical and dry years would result in a reduction of flow of up to 2 percent in May, as well as an increase in flow of up 3 percent in January, relative to the No Action condition. During wet, above normal, and below normal water years, implementation of the Proposed Action would result in a reduction of flow of up to 8 percent in May and September, as well as an increase in flow of up to 4 percent in August and October, relative to the No Action condition.

Table C-10. Long-term average Middle Fork American River flow below Ralston Afterbay, and average flow by water year type, under No Action and Proposed Action conditions.

Analysis Period	Flow (cfs)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	565	614	1,011	1,166	1,522	1,540	1,624	1,620	1,266	948	802	654
Proposed Action	579	619	1,009	1,175	1,527	1,549	1,624	1,564	1,260	970	825	635
Difference	14	5	-2	9	5	9	0	-56	-6	22	23	-19
Percent Difference[c]	2	1	0	1	0	1	0	-3	0	2	3	-3
Project Operation[d]												
No Action	754	823	1,007	1,177	1,177	2,056	2,244	2,380	1,693	1,086	960	825
Proposed Action	775	837	1,017	1,191	1,190	2,071	2,243	2,280	1,683	1,126	1,001	791
Difference	21	14	10	14	13	15	-1	-100	-10	40	41	-34
Percent Difference	3	2	1	1	1	1	0	-4	-1	4	4	-4
Water Year Types[e]												
Wet												
No Action	754	823	1,007	2,223	2,587	2,340	2,540	2,886	2,117	1,129	983	829
Proposed Action	775	837	1,017	2,231	2,595	2,353	2,547	2,797	2,101	1,165	1,019	763
Difference	21	14	10	8	8	13	7	-89	-16	36	36	-66
Percent Difference	3	2	1	0	0	1	0	-3	-1	3	4	-8
Above Normal												
No Action	617	614	1,000	1,777	1,831	2,216	1,797	1,977	1,331	1,153	919	801
Proposed Action	639	612	1,013	1,784	1,813	2,230	1,761	1,934	1,344	1,190	956	809
Difference	22	-2	13	7	-18	14	-36	-43	13	37	37	8
Percent Difference	4	0	1	0	-1	1	-2	-2	1	3	4	1
Below Normal												
No Action	706	717	1,139	815	1,350	1,193	1,678	1,385	993	951	881	724
Proposed Action	719	725	1,119	826	1,361	1,204	1,685	1,272	971	978	907	709
Difference	13	8	-20	11	11	11	7	-113	-22	27	26	-15
Percent Difference	2	1	-2	1	1	1	0	-8	-2	3	3	-2
Dry												
No Action	393	519	1,300	370	905	1,078	1,057	777	808	819	705	504
Proposed Action	399	518	1,283	378	913	1,082	1,061	765	817	829	715	513
Difference	6	-1	-17	8	8	4	4	-12	9	10	10	9
Percent Difference	2	0	-1	2	1	0	0	-2	1	1	1	2
Critical												
No Action	227	219	449	282	423	596	571	503	651	626	427	343
Proposed Action	227	219	449	290	431	596	571	503	651	626	427	343
Difference	0	0	0	8	8	0	0	0	0	0	0	0
Percent Difference	0	0	0	3	2	0	0	0	0	0	0	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Changes in Middle Fork American River flows downstream of Ralston Afterbay are provided in **Table C-11,** with implementation of the Proposed Action, relative to the No Water Delivery condition. Relative to the "Proposed Action vs. No Action" modeling results, long-term average flow would increase by up to 1 percent in January during above normal and dry years, in January and April during below normal years, and in January and February during critical water years. Relative to the "Proposed Action vs. No Action" modeling results, and long-term

average flow would decrease by up to 1 percent in April and June during below normal years, in September during dry years, and in August during critical water years under the "Proposed Action vs. No Water Delivery" condition.

Table C-11. Long-term average Middle Fork American River flow below Ralston Afterbay, and average flow by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	Flow (cfs)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	566	614	1,011	1,164	1,521	1,540	1,623	1,621	1,267	948	803	655
Proposed Action	579	619	1,009	1,175	1,527	1,549	1,624	1,564	1,260	970	825	635
Difference	13	5	-2	11	6	9	1	-57	-7	22	22	-20
Percent Difference[c]	2	1	0	1	0	1	0	-4	-1	2	3	-3
Project Operation[d]												
No Water Delivery	754	823	1,007	1,174	1,175	2,055	2,241	2,382	1,695	1,085	960	826
Proposed Action	775	837	1,017	1,191	1,190	2,071	2,243	2,280	1,683	1,126	1,001	791
Difference	21	14	10	17	15	16	2	-102	-12	41	41	-35
Percent Difference	3	2	1	1	1	1	0	-4	-1	4	4	-4
Water Year Types[e]												
Wet												
No Water Delivery	754	823	1,007	2,222	2,587	2,340	2,539	2,888	2,118	1,129	983	829
Proposed Action	775	837	1,017	2,231	2,595	2,353	2,547	2,797	2,101	1,165	1,019	763
Difference	21	14	10	9	8	13	8	-91	-17	36	36	-66
Percent Difference	3	2	1	0	0	1	0	-3	-1	3	4	-8
Above Normal												
No Water Delivery	617	615	1,000	1,774	1,831	2,216	1,795	1,981	1,331	1,152	919	801
Proposed Action	639	612	1,013	1,784	1,813	2,230	1,761	1,934	1,344	1,190	956	809
Difference	22	-3	13	10	-18	14	-34	-47	13	38	37	8
Percent Difference	4	0	1	1	-1	1	-2	-2	1	3	4	1
Below Normal												
No Water Delivery	707	717	1,139	813	1,349	1,192	1,676	1,386	996	952	882	724
Proposed Action	719	725	1,119	826	1,361	1,204	1,685	1,272	971	978	907	709
Difference	12	8	-20	13	12	12	9	-114	-25	26	25	-15
Percent Difference	2	1	-2	2	1	1	1	-8	-3	3	3	-2
Dry												
No Water Delivery	393	518	1,300	366	902	1,078	1,056	779	810	820	706	507
Proposed Action	399	518	1,283	378	913	1,082	1,061	765	817	829	715	513
Difference	6	0	-17	12	11	4	5	-14	7	9	9	6
Percent Difference	2	0	-1	3	1	0	0	-2	1	1	1	1
Critical												
No Water Delivery	227	219	448	278	419	596	571	503	652	627	430	344
Proposed Action	227	219	449	290	431	596	571	503	651	626	427	343
Difference	0	0	1	12	12	0	0	0	-1	-1	-3	-1
Percent Difference	0	0	0	4	3	0	0	0	0	0	-1	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

5.2 FOLSOM RESERVOIR STORAGE AND ELEVATION

Implementation of the Proposed Action requires that diversions at Folsom Reservoir associated with the Proposed Action be made at the same time and on the same temporal pattern that the related releases are made from the MFP reservoirs. This results in Folsom Reservoir essentially being treated as an open channel for hydrologic modeling purposes. Increases in inflow to Folsom Reservoir associated with releases of Proposed Action water would be directly countered by increases in diversions from Folsom Reservoir to the SSWD long-term WA service area.

With implementation of the Proposed Action, changes in Folsom Reservoir storage and elevation could only occur during periods when MFP storage debt is being refilled (as described in Section 5.1 above), and Folsom Reservoir storage is not constrained by flood control. As part of the hydrologic analysis it is assumed that Folsom Reservoir releases are reduced commensurate with the inflow reduction during these periods, thus maintaining Folsom Reservoir storage under the Proposed Action equal to the No Action and No Water Delivery conditions (see Section 5.3 for further discussion).

Changes in Folsom Reservoir inflow, storage, and elevation associated with implementation of the Proposed Action relative to the No Action condition are provided in **Table C-12** through **Table C-14**. As shown in Table C-12, during those years of project operation, inflow would be reduced by up to 2 percent in September under the Proposed Action, relative to the No Action condition. Increases in inflow would range from 1 percent in July and October to 2 percent in August under the Proposed Action, relative to the No Action condition.

Hydrologic conditions under the Proposed Action during critical and dry years would result in no reductions in inflows and an increase in flow of up 1 percent in January, July, August, and September, relative to the No Action condition. During wet, above normal, and below normal water years, implementation of the Proposed Action would result in a reduction of inflow of up to 3 percent in September, as well as an increase in inflow of up to 2 percent in July, August and October, relative to the No Action condition.

As shown in Table C-13 and Table C-14, no changes in Folsom Reservoir storage and surface water elevation would occur with implementation of the Proposed Action, relative to the No Action condition.

Changes in Folsom Reservoir inflow, storage, and elevation associated with implementation of the Proposed Action relative to the No Water Delivery condition are provided in **Table C-15** through **Table C-17**. Relative to the "Proposed Action vs. No Action" modeling results, inflow would increase by up to 1 percent in July during those years of project operation, in September during dry years, and in February during critical water years under the "Proposed Action vs. No Water Delivery" condition. As shown in Table C-16 and Table C-17, no changes in Folsom Reservoir storage and surface water elevation would occur under the "Proposed Action vs. No Water Delivery" condition.

Table C-12. Long-term average Folsom Reservoir inflow, and average inflow by water year type, under No Action and Proposed Action conditions.

Analysis Period	Inflow (cfs)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	1,529	2,330	3,649	4,410	5,402	5,444	5,715	5,768	3,606	1,995	1,727	1,686
Proposed Action	1,543	2,335	3,646	4,419	5,407	5,452	5,714	5,712	3,601	2,018	1,750	1,667
Difference	14	5	-3	9	5	8	-1	-56	-5	23	23	-19
Percent Difference[c]	1	0	0	0	0	0	0	-1	0	1	1	-1
Project Operation[d]												
No Action	1,838	2,838	3,601	4,333	4,273	7,199	7,692	8,270	5,193	2,705	2,108	1,998
Proposed Action	1,860	2,851	3,611	4,346	4,286	7,214	7,691	8,171	5,184	2,745	2,148	1,965
Difference	22	13	10	13	13	15	-1	-99	-9	40	40	-33
Percent Difference	1	0	0	0	0	0	0	-1	0	1	2	-2
Water Year Types[e]												
Wet												
No Action	1,838	2,838	3,601	8,036	8,898	8,099	8,462	9,319	6,473	3,138	2,259	2,103
Proposed Action	1,860	2,851	3,611	8,043	8,906	8,112	8,468	9,231	6,456	3,174	2,295	2,037
Difference	22	13	10	7	8	13	6	-88	-17	36	36	-66
Percent Difference	1	0	0	0	0	0	0	-1	0	1	2	-3
Above Normal												
No Action	1,426	2,263	3,601	6,696	6,667	7,944	6,565	7,023	3,750	2,176	1,942	1,855
Proposed Action	1,449	2,261	3,614	6,703	6,649	7,958	6,530	6,979	3,763	2,212	1,980	1,863
Difference	23	-2	13	7	-18	14	-35	-44	13	36	38	8
Percent Difference	2	0	0	0	0	0	-1	-1	0	2	2	0
Below Normal												
No Action	1,864	2,763	4,096	3,164	5,003	4,170	5,965	5,621	2,988	1,924	1,811	1,783
Proposed Action	1,877	2,771	4,076	3,175	5,014	4,180	5,971	5,509	2,965	1,951	1,837	1,768
Difference	13	8	-20	11	11	10	6	-112	-23	27	26	-15
Percent Difference	1	0	0	0	0	0	0	-2	-1	1	1	-1
Dry												
No Action	1,292	2,131	4,527	1,677	3,172	3,946	4,072	3,374	1,886	1,243	1,467	1,535
Proposed Action	1,298	2,130	4,510	1,685	3,180	3,950	4,076	3,363	1,895	1,253	1,478	1,543
Difference	6	-1	-17	8	8	4	4	-11	9	10	11	8
Percent Difference	0	0	0	0	0	0	0	0	0	1	1	1
Critical												
No Action	961	1,168	1,941	1,261	1,668	2,195	2,099	1,868	1,485	931	865	906
Proposed Action	961	1,168	1,941	1,268	1,676	2,195	2,099	1,867	1,485	931	865	906
Difference	0	0	0	7	8	0	0	-1	0	0	0	0
Percent Difference	0	0	0	1	0	0	0	0	0	0	0	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-13. Long-term average Folsom Reservoir storage, and average storage by water year type, under No Action and Proposed Action conditions.

Analysis Period	End-of-Month Storage (TAF)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	468	444	457	476	498	600	712	816	758	605	545	501
Proposed Action	468	444	457	476	498	600	712	816	758	605	545	501
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference[c]	0	0	0	0	0	0	0	0	0	0	0	0
Project Operation[d]												
No Action	607	553	537	526	534	628	791	964	921	766	688	613
Proposed Action	607	553	537	526	534	628	791	964	921	766	688	613
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Water Year Types[e]												
Wet												
No Action	607	553	537	517	497	626	784	956	951	830	743	630
Proposed Action	607	553	537	517	497	626	784	956	951	830	743	630
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal												
No Action	513	481	504	523	526	637	790	950	863	673	607	558
Proposed Action	513	481	504	523	526	637	790	950	863	673	607	558
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal												
No Action	505	469	485	513	546	634	771	889	815	596	547	533
Proposed Action	505	469	485	513	546	634	771	889	815	596	547	533
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Dry												
No Action	369	382	389	451	515	613	700	732	622	462	422	423
Proposed Action	369	382	389	451	515	613	700	732	622	462	422	423
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Critical												
No Action	256	257	321	355	400	465	470	485	447	353	311	295
Proposed Action	256	257	321	355	400	465	470	485	447	353	311	295
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-14. Long-term average Folsom Reservoir surface water elevation, and average elevation by water year type, under No Action and Proposed Action conditions.

Analysis Period	End-of-Month Elevation (feet msl)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	409	406	409	411	414	427	439	449	443	425	418	414
Proposed Action	409	406	409	411	414	427	439	449	443	425	418	414
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Project Operation[c]												
No Action	428	422	419	418	419	431	448	465	461	445	437	429
Proposed Action	428	422	419	418	419	431	448	465	461	445	437	429
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Water Year Types[d]												
Wet												
No Action	414	413	418	417	414	431	447	464	463	451	443	431
Proposed Action	414	413	418	417	414	431	447	464	463	451	443	431
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal												
No Action	404	399	405	418	418	432	448	463	455	435	427	422
Proposed Action	404	399	405	418	418	432	448	463	455	435	427	422
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal												
No Action	413	410	409	416	421	432	446	457	449	425	420	418
Proposed Action	413	410	409	416	421	432	446	457	449	425	420	418
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Dry												
No Action	406	405	408	408	417	429	439	442	429	410	404	404
Proposed Action	406	405	408	408	417	429	439	442	429	410	404	404
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Critical												
No Action	404	398	395	394	401	410	410	412	407	393	386	384
Proposed Action	404	398	395	394	401	410	410	412	407	393	386	384
Difference	0	0	0	0	0	0	0	0	0	0	0	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[d] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-15. Long-term average Folsom Reservoir inflow, and average inflow by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	Inflow (cfs)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	1,529	2,330	3,649	4,408	5,400	5,443	5,714	5,769	3,608	1,996	1,728	1,687
Proposed Action	1,543	2,335	3,646	4,419	5,407	5,452	5,714	5,712	3,601	2,018	1,750	1,667
Difference	14	5	-3	11	7	9	0	-57	-7	22	22	-20
Percent Difference[c]	1	0	0	0	0	0	0	-1	0	1	1	-1
Project Operation[d]												
No Water Delivery	1,838	2,838	3,601	4,329	4,271	7,198	7,690	8,273	5,195	2,704	2,108	1,999
Proposed Action	1,860	2,851	3,611	4,346	4,286	7,214	7,691	8,171	5,184	2,745	2,148	1,965
Difference	22	13	10	17	15	16	1	-102	-11	41	40	-34
Percent Difference	1	0	0	0	0	0	0	-1	0	2	2	-2
Water Year Types[e]												
Wet												
No Water Delivery	1,838	2,838	3,601	8,035	8,898	8,099	8,460	9,321	6,473	3,138	2,259	2,103
Proposed Action	1,860	2,851	3,611	8,043	8,906	8,112	8,468	9,231	6,456	3,174	2,295	2,037
Difference	22	13	10	8	8	13	8	-90	-17	36	36	-66
Percent Difference	1	0	0	0	0	0	0	-1	0	1	2	-3
Above Normal												
No Water Delivery	1,426	2,264	3,601	6,693	6,667	7,944	6,564	7,026	3,750	2,175	1,942	1,855
Proposed Action	1,449	2,261	3,614	6,703	6,649	7,958	6,530	6,979	3,763	2,212	1,980	1,863
Difference	23	-3	13	10	-18	14	-34	-47	13	37	38	8
Percent Difference	2	0	0	0	0	0	-1	-1	0	2	2	0
Below Normal												
No Water Delivery	1,865	2,763	4,096	3,162	5,001	4,169	5,963	5,622	2,991	1,924	1,812	1,783
Proposed Action	1,877	2,771	4,076	3,175	5,014	4,180	5,971	5,509	2,965	1,951	1,837	1,768
Difference	12	8	-20	13	13	11	8	-113	-26	27	25	-15
Percent Difference	1	0	0	0	0	0	0	-2	-1	1	1	-1
Dry												
No Water Delivery	1,292	2,130	4,527	1,674	3,169	3,946	4,071	3,376	1,888	1,244	1,469	1,537
Proposed Action	1,298	2,130	4,510	1,685	3,180	3,950	4,076	3,363	1,895	1,253	1,478	1,543
Difference	6	0	-17	11	11	4	5	-13	7	9	9	6
Percent Difference	0	0	0	1	0	0	0	0	0	1	1	0
Critical												
No Water Delivery	961	1,168	1,941	1,257	1,664	2,195	2,099	1,868	1,487	932	868	907
Proposed Action	961	1,168	1,941	1,268	1,676	2,195	2,099	1,867	1,485	931	865	906
Difference	0	0	0	11	12	0	0	-1	-2	-1	-3	-1
Percent Difference	0	0	0	1	1	0	0	0	0	0	0	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-16. Long-term average Folsom Reservoir storage, and average storage by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	End-of-Month Storage (TAF)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	468	444	457	476	498	600	712	816	758	604	545	501
Proposed Action	468	444	457	476	498	600	712	816	758	605	545	501
Difference	0	0	0	0	0	0	0	0	0	1	0	0
Percent Difference[c]	0	0	0	0	0	0	0	0	0	0	0	0
Project Operation[d]												
No Water Delivery	607	553	537	526	534	628	791	964	921	766	688	613
Proposed Action	607	553	537	526	534	628	791	964	921	766	688	613
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Water Year Types[e]												
Wet												
No Water Delivery	607	553	537	517	497	626	784	956	951	830	743	630
Proposed Action	607	553	537	517	497	626	784	956	951	830	743	630
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal												
No Water Delivery	513	481	504	523	526	637	790	950	863	673	607	558
Proposed Action	513	481	504	523	526	637	790	950	863	673	607	558
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal												
No Water Delivery	505	469	485	512	546	634	771	889	815	596	547	533
Proposed Action	505	469	485	513	546	634	771	889	815	596	547	533
Difference	0	0	0	1	0	0	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Dry												
No Water Delivery	369	382	389	451	515	613	700	731	622	462	422	423
Proposed Action	369	382	389	451	515	613	700	732	622	462	422	423
Difference	0	0	0	0	0	0	0	1	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0
Critical												
No Water Delivery	256	257	321	355	400	464	470	485	447	353	311	295
Proposed Action	256	257	321	355	400	465	470	485	447	353	311	295
Difference	0	0	0	0	0	1	0	0	0	0	0	0
Percent Difference	0	0	0	0	0	0	0	0	0	0	0	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-17. Long-term average Folsom Reservoir surface water elevation, and average elevation by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	End-of-Month Elevation (feet msl)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	409	406	409	411	414	427	439	449	443	425	418	414
Proposed Action	409	406	409	411	414	427	439	449	443	425	418	414
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Project Operation[c]												
No Water Delivery	428	422	419	418	419	431	448	465	461	445	437	429
Proposed Action	428	422	419	418	419	431	448	465	461	445	437	429
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Water Year Types[d]												
Wet												
No Water Delivery	414	413	418	417	414	431	447	464	463	451	443	431
Proposed Action	414	413	418	417	414	431	447	464	463	451	443	431
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal												
No Water Delivery	404	399	405	418	418	432	448	463	455	435	427	422
Proposed Action	404	399	405	418	418	432	448	463	455	435	427	422
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal												
No Water Delivery	413	410	409	416	421	432	446	457	450	425	420	418
Proposed Action	413	410	409	416	421	432	446	457	449	425	420	418
Difference	0	0	0	0	0	0	0	0	-1	0	0	0
Dry												
No Water Delivery	406	405	408	408	417	429	438	442	429	410	404	404
Proposed Action	406	405	408	408	417	429	439	442	429	410	404	404
Difference	0	0	0	0	0	0	1	0	0	0	0	0
Critical												
No Water Delivery	404	398	395	394	401	410	410	412	407	393	386	384
Proposed Action	404	398	395	394	401	410	410	412	407	393	386	384
Difference	0	0	0	0	0	0	0	0	0	0	0	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[d] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

5.3 FOLSOM RESERVOIR SPILL AND LOWER AMERICAN RIVER FLOOD EVENTS

As described in Section 5.2 and Table C-12 and C-15 above, implementation of the Proposed Action would change inflow to Folsom Reservoir, relative to the No Action and No Water Delivery conditions. During those months when Folsom Reservoir inflows are reduced, Folsom spills (identified in the No Action condition) are reduced to compensate for the reduction in inflow, thus maintaining Folsom Reservoir storage under the Proposed Action, relative to the No Action condition (see Table C-13 regarding potential changes in Folsom Reservoir storage).

As shown in **Table C-18**, there would be minor changes in the frequency of spill from Folsom Reservoir with implementation of the Proposed Action, relative to the No Action condition. There would be one less month in April, May, and June during those years of project operation,

one less month in April during above normal years, and one less month in May and June during below normal years having a spill event under the Proposed Action, relative to the No Action condition. Similarly, as shown in **Table C-19**, the magnitude of spill from Folsom Reservoir would decrease by up to 8 percent (69 TAF) in September during those years of project operation, 7 percent (98 TAF) in September during wet years, 10 percent (24 TAF) in September during above normal years, 38 percent (133 TAF) in May during below normal years, 66 percent (19 TAF) in May during dry years, and would not change during critical years under the Proposed Action, relative to the No Action condition.

Table C-18. Long-term and water year type number of months Folsom Reservoir spills under No Action and Proposed Action conditions.

Analysis Period	Number of Months											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	2	13	21	31	42	42	34	28	24	1	1	22
Proposed Action	2	13	21	31	42	42	33	27	23	1	1	22
Difference	0	0	0	0	0	0	-1	-1	-1	0	0	0
Project Operation[c]												
No Action	1	10	14	18	26	32	31	28	24	1	1	22
Proposed Action	1	10	14	18	26	32	30	27	23	1	1	22
Difference	0	0	0	0	0	0	-1	-1	-1	0	0	0
Water Year Types[d]												
Wet												
No Action	1	9	9	9	12	17	16	15	16	1	1	17
Proposed Action	1	9	9	9	12	17	16	15	16	1	1	17
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal												
No Action	0	1	3	5	7	10	8	6	4	0	0	2
Proposed Action	0	1	3	5	7	10	7	6	4	0	0	2
Difference	0	0	0	0	0	0	-1	0	0	0	0	0
Below Normal												
No Action	1	2	5	9	9	9	7	6	4	0	0	3
Proposed Action	1	2	5	9	9	9	7	5	3	0	0	3
Difference	0	0	0	0	0	0	0	-1	-1	0	0	0
Dry												
No Action	0	1	4	6	10	6	3	1	0	0	0	0
Proposed Action	0	1	4	6	10	6	3	1	0	0	0	0
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Critical												
No Action	0	0	0	2	4	0	0	0	0	0	0	0
Proposed Action	0	0	0	2	4	0	0	0	0	0	0	0
Difference	0	0	0	0	0	0	0	0	0	0	0	0

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[d] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-19. Long-term average Folsom Reservoir surplus spill, and average surplus spill by water year type, under No Action and Proposed Action conditions.

Analysis Period	Surplus Spill (TAF)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Action	11	598	1,617	2,438	3,197	1,943	1,197	1,045	1,050	48	32	487
Proposed Action	10	593	1,605	2,438	3,193	1,943	1,184	972	1,024	48	32	449
Difference	-1	-5	-12	0	-4	0	-13	-73	-26	0	0	-38
Percent Difference[c]	-9	-1	-1	0	0	0	-1	-7	-2	0	0	-8
Project Operation[d]												
No Action	14	1,098	1,573	2,556	2,088	3,199	2,041	1,860	1,870	86	57	868
Proposed Action	13	1,095	1,569	2,556	2,087	3,198	2,018	1,730	1,824	85	56	799
Difference	-1	-3	-4	0	-1	-1	-23	-130	-46	-1	-1	-69
Percent Difference	-7	0	0	0	0	0	-1	-7	-2	-1	-2	-8
Water Year Types[e]												
Wet												
No Action	14	1,098	1,573	6,182	7,110	3,896	2,860	2,929	2,915	167	112	1,504
Proposed Action	13	1,095	1,569	6,182	7,109	3,894	2,846	2,813	2,865	165	110	1,406
Difference	-1	-3	-4	0	-1	-2	-14	-116	-50	-2	-2	-98
Percent Difference	-7	0	0	0	0	0	0	-4	-2	-1	-2	-7
Above Normal												
No Action	0	335	1,210	3,931	4,517	3,788	1,017	943	973	0	0	233
Proposed Action	0	317	1,208	3,929	4,490	3,788	961	871	953	0	0	209
Difference	0	-18	-2	-2	-27	0	-56	-72	-20	0	0	-24
Percent Difference	--	-5	0	0	-1	0	-6	-8	-2	--	--	-10
Below Normal												
No Action	34	1,051	1,914	610	2,383	832	1,058	348	410	0	0	118
Proposed Action	31	1,048	1,884	610	2,383	832	1,050	215	364	0	0	81
Difference	-3	-3	-30	0	0	0	-8	-133	-46	0	0	-37
Percent Difference	-9	0	-2	0	0	0	-1	-38	-11	--	--	-31
Dry												
No Action	0	138	2,806	20	349	659	145	29	0	0	0	0
Proposed Action	0	132	2,785	20	349	659	144	10	0	0	0	0
Difference	0	-6	-21	0	0	0	-1	-19	0	0	0	0
Percent Difference	--	-4	-1	0	0	0	-1	-66	--	--	--	--
Critical												
No Action	0	0	0	0	0	0	0	0	0	0	0	0
Proposed Action	0	0	0	0	0	0	0	0	0	0	0	0
Difference	0	0	0	0	0	0	0	0	0	0	0	0
Percent Difference	--	--	--	--	--	--	--	--	--	--	--	--

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Changes in the frequency of spill from Folsom Reservoir with implementation of the Proposed Action relative to the No Water Delivery condition are provided in **Table C-20**. Relative to the "Proposed Action vs. No Action" modeling results, there would be up to 5 fewer months having a spill event in October, November, and June during those years of project operations, and up to 7 fewer months in September and October during dry water years, under the "Proposed Action vs. No Water Delivery" condition. Changes in the magnitude of spill from

Folsom Reservoir with implementation of the Proposed Action relative to the No Water Delivery condition are provided in **Table C-21**. Relative to the "Proposed Action vs. No Action" modeling results, the magnitude of spill would decrease by up to 1 percent in June and August during those years of project operation, 1 percent in September and November during above normal years, 2 percent in October and 1 percent in June and September during below normal water years, and by 3 percent in November and 2 percent in May during dry water years, under the "Proposed Action vs. No Water Delivery" condition.

Table C-20. Long-term and water year type number of months Folsom Reservoir spills under No Water Delivery and Proposed Action conditions.

Analysis Period	Number of Months											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	16	26	30	35	44	43	35	35	32	9	13	35
Proposed Action	2	13	21	31	42	42	33	27	23	1	1	22
Difference	-14	-13	-9	-4	-2	-1	-2	-8	-9	-8	-12	-13
Project Operation[c]												
No Water Delivery	6	15	18	20	26	32	31	32	29	5	5	26
Proposed Action	1	10	14	18	26	32	30	27	23	1	1	22
Difference	-5	-5	-4	-2	0	0	-1	-5	-6	-4	-4	-4
Water Year Types[d]												
Wet												
No Water Delivery	1	9	9	9	12	17	16	16	16	1	1	17
Proposed Action	1	9	9	9	12	17	16	15	16	1	1	17
Difference	0	0	0	0	0	0	0	-1	0	0	0	0
Above Normal												
No Water Delivery	1	2	4	6	7	10	8	7	5	1	1	3
Proposed Action	0	1	3	5	7	10	7	6	4	0	0	2
Difference	-1	-1	-1	-1	0	0	-1	-1	-1	-1	-1	-1
Below Normal												
No Water Delivery	4	5	7	9	9	9	7	8	7	3	3	5
Proposed Action	1	2	5	9	9	9	7	5	3	0	0	3
Difference	-3	-3	-2	0	0	0	0	-3	-4	-3	-3	-2
Dry												
No Water Delivery	7	7	8	8	11	6	3	3	3	3	5	7
Proposed Action	0	1	4	6	10	6	3	1	0	0	0	0
Difference	-7	-6	-4	-2	-1	0	0	-2	-3	-3	-5	-7
Critical												
No Water Delivery	3	3	2	3	5	1	1	1	1	1	3	3
Proposed Action	0	0	0	2	4	0	0	0	0	0	0	0
Difference	-3	-3	-2	-1	-1	-1	-1	-1	-1	-1	-3	-3

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[d] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

Table C-21. Long-term average Folsom Reservoir surplus spill, and average surplus spill by water year type, under No Water Delivery and Proposed Action conditions.

Analysis Period	Surplus Spill (TAF)											
	Oct[a]	Nov[a]	Dec[a]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-Term												
Full Simulation Period[b]												
No Water Delivery	12	600	1,618	2,439	3,197	1,943	1,196	1,046	1,052	49	33	489
Proposed Action	10	593	1,605	2,438	3,193	1,943	1,184	972	1,024	48	32	449
Difference	-2	-7	-13	-1	-4	0	-12	-74	-28	-1	-1	-40
Percent Difference[c]	-17	-1	-1	0	0	0	-1	-7	-3	-2	-3	-8
Project Operation[d]												
No Water Delivery	14	1,098	1,573	2,556	2,086	3,198	2,040	1,862	1,872	86	58	869
Proposed Action	13	1,095	1,569	2,556	2,087	3,198	2,018	1,730	1,824	85	56	799
Difference	-1	-3	-4	0	1	0	-22	-132	-48	-1	-2	-70
Percent Difference	-7	0	0	0	0	0	-1	-7	-3	-1	-3	-8
Water Year Types[e]												
Wet												
No Water Delivery	14	1,098	1,573	6,183	7,110	3,896	2,859	2,931	2,916	167	112	1,504
Proposed Action	13	1,095	1,569	6,182	7,109	3,894	2,846	2,813	2,865	165	110	1,406
Difference	-1	-3	-4	-1	-1	-2	-13	-118	-51	-2	-2	-98
Percent Difference	-7	0	0	0	0	0	0	-4	-2	-1	-2	-7
Above Normal												
No Water Delivery	1	336	1,211	3,931	4,515	3,788	1,017	944	974	1	1	234
Proposed Action	0	317	1,208	3,929	4,490	3,788	961	871	953	0	0	209
Difference	-1	-19	-3	-2	-25	0	-56	-73	-21	-1	-1	-25
Percent Difference	-100	-6	0	0	-1	0	-6	-8	-2	-100	-100	-11
Below Normal												
No Water Delivery	35	1,052	1,915	612	2,383	831	1,058	349	412	1	1	119
Proposed Action	31	1,048	1,884	610	2,383	832	1,050	215	364	0	0	81
Difference	-4	-4	-31	-2	0	1	-8	-134	-48	-1	-1	-38
Percent Difference	-11	0	-2	0	0	0	-1	-38	-12	-100	-100	-32
Dry												
No Water Delivery	5	142	2,809	19	348	656	145	31	2	2	3	5
Proposed Action	0	132	2,785	20	349	659	144	10	0	0	0	0
Difference	-5	-10	-24	1	1	3	-1	-21	-2	-2	-3	-5
Percent Difference	-100	-7	-1	5	0	0	-1	-68	-100	-100	-100	-100
Critical												
No Water Delivery	1	1	1	0	0	0	0	0	0	0	1	1
Proposed Action	0	0	0	0	0	0	0	0	0	0	0	0
Difference	-1	-1	-1	0	0	0	0	0	0	0	-1	-1
Percent Difference	-100	-100	-100	--	--	--	--	--	--	--	-100	-100

[a] Based on the previous year's water year type
[b] Based on the 73-year simulation period
[c] Relative difference of the monthly average
[d] Project operation would occur during "above Hodge" years (those years when the March through November unimpaired inflow exceeds 1,600,000 AF; see Section 2.1.2, Water Delivery Planning and Coordination, of the EA for further discussion)
[e] As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (RWQCB 1995)

5.4 LOWER AMERICAN RIVER WATER TEMPERATURE

Lower American River water temperatures were simulated using the CPMM for the Proposed Action, No Action, and No Water Delivery conditions. Although Folsom Reservoir releases are

not anticipated to change with implementation of the Proposed Action, changes in inflow to Folsom Reservoir could potentially affect the coldwater pool in Folsom Reservoir. Changes in inflow to Folsom Reservoir could contribute a larger volume of colder or warmer water under the Proposed Action, relative to the No Action and No Water Delivery conditions, thereby resulting in potential affects on the volume of the Folsom Reservoir coldwater pool.

To model potential changes in the Folsom Reservoir coldwater pool, a "worst case" scenario was developed for analysis. For this analysis it was assumed that potential effects would be maximized under a worst case scenario and that impacts in all other situations would be less than the worst case scenario, including potential effects with implementation of the Proposed Action. The analysis was performed by selecting an individual year having both high water temperatures and low Folsom Reservoir inflow, based on Reclamation's water temperature models with ATSP and the Hydrologic Post-Processing Tool. Temperature simulations for Folsom Reservoir and the lower American River were performed with and without implementation of the Proposed Action.

The analysis used modeled temperatures based on the CALSIM II simulation representing the No Action and No Water Delivery conditions (OCAP Future SDIP 020204) and Reclamation's water temperature models with ATSP applied to the lower American River as an initial condition (see Sections 2.1 and 4.1 for further information regarding CALSIM II). This simulation procedure selects the preferred schedule of water temperatures for each year that can be met over the course of the year on the lower American River (see Section 2.4.2, Automated Temperature Selection Procedure, for further discussion).

Of the 73 total years included within the simulation period (see Attachment 1), there are 41 "above Hodge" years (i.e., those years when the March through November unimpaired inflow exceeds 1,600,000 AF) in which the proposed diversion from Folsom Reservoir under Proposed Action would occur. These 41 years were sorted based on the temperature schedule selected by the ATSP, and 1932 was selected as the worst-case year. Although 1932 had the second worst temperature schedule, it had significantly less inflow during the summer period than the year with the worst temperature schedule.

The year 1932 was then modeled using the CPMM for the No Action, No Water Delivery, and Proposed Action conditions. This model is a shorter time step, daily, temperature model of Folsom Reservoir and the lower American River. The monthly time step data for 1932 from the monthly simulation (CALSIM II and Reclamation's water temperature models with ATSP) was converted to the shorter time steps required for the CPMM and the model was run with and without implementation of the Proposed Action.

As shown in **Figure C-1**, water temperatures would tend to decrease during the summer and early fall with implementation of the Proposed Action, relative to the No Action and No Water Delivery conditions. These decreases are associated with changes in the timing and magnitude of inflows to Folsom Reservoir and are the result of the worst-case modeling scenario described above. Generally, changes in lower American River water temperature at Watt Avenue with implementation of the Proposed Action would be minor. As shown in **Table C-22**, the maximum increase in water temperature would be 1.8 ˚F in mid-November, and the maximum decrease in water temperature would be 5.2˚F in early November. The average change in water

temperature with implementation of the Proposed Action, relative to the No Action condition, would be a decrease in water temperature of 0.2 ˚F.

Changes in lower American River water temperature at Watt Avenue with implementation of the Proposed Action relative to the No Water Delivery condition also are provided in Table C-22. There would be no change in average water temperature with implementation of the Proposed Action, relative to the No Water Delivery condition. Relative to the "Proposed Action vs. No Action" modeling results, the maximum increase in water temperature would be 3.0˚F in late September, and the maximum decrease in water temperature would be 3.6˚F in early September, under the "Proposed Action vs. No Water Delivery" condition.

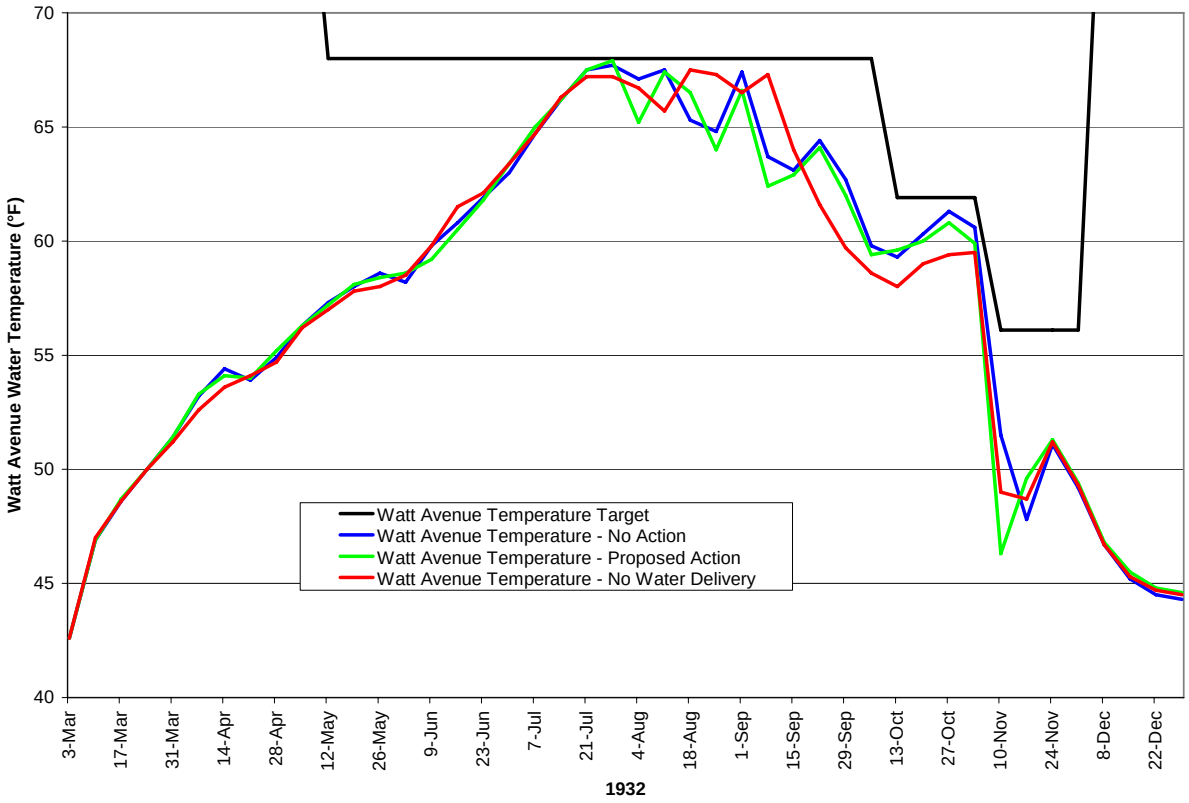

Figure C-1. CPMM lower American River water temperatures at Watt Avenue under No Action, No Water Delivery, and Proposed Action conditions (1932).

Table C-22. Lower American River water temperature at Watt Avenue.

Date (1932)	(°F)				
	No Water Delivery	No Action	Proposed Action	Proposed Action Minus No Action	Proposed Action Minus No Water Delivery
3-Mar	42.6	42.6	42.6	0	0
10-Mar	47.0	46.9	46.9	0	-0.1
17-Mar	48.6	48.6	48.7	0.1	0.1
24-Mar	50.0	50.0	50.0	0	0
31-Mar	51.2	51.4	51.4	0	0.2

Table C-22. Lower American River water temperature at Watt Avenue.

Date (1932)	(°F)				
	No Water Delivery	No Action	Proposed Action	Proposed Action Minus No Action	Proposed Action Minus No Water Delivery
7-Apr	52.6	53.2	53.3	0.1	0.7
14-Apr	53.6	54.4	54.1	-0.3	0.5
21-Apr	54.1	53.9	54.0	0.1	-0.1
28-Apr	54.7	54.9	55.2	0.3	0.5
5-May	56.2	56.3	56.3	0	0.1
12-May	57.0	57.3	57.2	-0.1	0.2
19-May	57.8	58.0	58.1	0.1	0.3
26-May	58.0	58.6	58.4	-0.2	0.4
2-Jun	58.5	58.2	58.6	0.4	0.1
9-Jun	59.8	59.8	59.2	-0.6	-0.6
16-Jun	61.5	60.8	60.5	-0.3	-1.0
23-Jun	62.1	61.9	61.8	-0.1	-0.3
30-Jun	63.4	63.0	63.4	0.4	0
7-Jul	64.7	64.7	65.0	0.3	0.3
14-Jul	66.3	66.2	66.2	0	-0.1
21-Jul	67.2	67.5	67.5	0	0.3
28-Jul	67.2	67.7	67.9	0.2	0.7
4-Aug	66.7	67.1	65.2	-1.9	-1.5
11-Aug	65.7	67.5	67.4	-0.1	1.7
18-Aug	67.5	65.3	66.5	1.2	-1.0
25-Aug	67.3	64.8	64.0	-0.8	-3.3
1-Sep	66.5	67.4	66.6	-0.8	0.1
8-Sep	67.3	63.7	62.4	-1.3	-4.9
15-Sep	64.0	63.1	62.9	-0.2	-1.1
22-Sep	61.6	64.4	64.1	-0.3	2.5
29-Sep	59.7	62.7	62.0	-0.7	2.3
6-Oct	58.6	59.8	59.4	-0.4	0.8
13-Oct	58.0	59.3	59.6	0.3	1.6
20-Oct	59.0	60.3	60.0	-0.3	1.0
27-Oct	59.4	61.3	60.8	-0.5	1.4
3-Nov	59.5	60.6	59.9	-0.7	0.4
10-Nov	49.0	51.5	46.3	-5.2	-2.7
17-Nov	48.7	47.8	49.6	1.8	0.9
24-Nov	51.2	51.1	51.3	0.2	0.1
1-Dec	49.3	49.2	49.4	0.2	0.1
8-Dec	46.7	46.7	46.8	0.1	0.1
15-Dec	45.3	45.2	45.5	0.3	0.2
22-Dec	44.7	44.5	44.8	0.3	0.1
29-Dec	44.5	44.3	44.6	0.3	0.1
Average	**57.1**	**57.4**	**57.2**	**-0.2**	**0.0**
Minimum	**42.6**	**42.6**	**42.6**	**-5.2**	**-4.9**
Maximum	**67.5**	**67.7**	**67.9**	**1.8**	**2.5**

6.0 REFERENCES

PCWA and NWD. 1998. Groundwater Stabilization Project, Draft Environmental Impact Report. Prepared by Surface Water Resources, Inc.

RWQCB. 1995. Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.

ATTACHMENT 1
FOLSOM RESERVOIR INFLOW (1922-1993) AND ATSP SCHEDULE

Water Year	Above Hodge	Folsom Reservoir Inflow (CFS)												ATSP SCHED
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
1922	YES	1,018	1,452	3,066	2,160	6,296	5,111	6,811	12,606	9,887	2,837	1,918	1,762	34
1923	YES	1,581	2,116	6,954	4,635	3,188	3,047	7,490	7,710	3,355	2,725	1,992	1,981	196
1924	NO	1,490	1,082	1,056	950	1,780	865	1,252	1,229	977	913	860	785	291
1925	YES	1,102	1,458	1,841	1,212	9,104	3,877	7,321	7,220	3,200	2,093	1,752	1,845	123
1926	NO	1,563	1,709	1,663	1,228	4,629	2,235	6,218	1,818	990	997	1,116	1,290	312
1927	YES	1,282	4,036	3,025	3,714	13,270	6,327	10,388	7,929	5,836	2,457	2,047	1,973	70
1928	YES	1,613	2,831	2,498	2,014	2,432	13,909	7,692	4,643	1,384	1,105	1,803	1,634	241
1929	NO	1,043	1,241	1,396	1,034	1,925	2,322	2,631	2,679	2,054	1,161	1,037	1,269	334
1930	NO	1,051	914	3,518	2,513	2,429	4,595	3,784	2,547	1,715	1,331	1,941	1,873	207
1931	NO	1,037	1,420	997	1,282	1,369	1,964	1,522	1,717	1,363	1,074	914	897	453
1932	YES	1,003	1,171	3,073	2,767	5,524	3,948	4,171	6,526	5,152	2,602	1,904	1,824	259
1933	NO	1,377	1,401	1,339	1,253	1,201	2,359	2,818	3,393	3,244	1,297	1,725	1,280	348
1934	NO	1,307	1,283	2,630	2,697	2,696	2,771	1,997	1,161	940	729	387	973	328
1935	YES	1,166	1,913	1,698	2,872	2,741	3,477	11,041	7,159	4,750	2,301	2,033	1,903	117
1936	YES	1,697	1,635	1,428	6,827	13,368	5,898	8,020	7,198	5,279	2,718	2,089	1,965	241
1937	YES	1,473	1,264	1,274	1,300	5,910	6,120	6,674	7,097	2,706	2,221	2,043	1,875	140
1938	YES	1,587	1,912	6,857	2,951	9,754	12,686	10,309	12,787	9,363	3,483	2,278	2,071	87
1939	NO	1,668	1,658	1,462	1,276	1,474	3,058	2,901	1,603	1,062	718	580	1,257	386
1940	YES	1,379	1,150	1,324	7,412	10,421	11,878	9,232	6,364	2,419	2,003	2,003	1,938	157
1941	YES	1,477	1,608	4,977	5,866	8,125	6,569	6,127	8,186	3,827	2,574	2,131	2,003	22
1942	YES	1,609	1,882	5,756	9,237	9,902	4,238	8,505	9,855	7,814	3,394	2,281	2,038	65
1943	YES	1,537	3,740	4,845	10,660	6,815	13,892	8,270	5,778	3,485	2,602	2,158	1,981	86
1944	NO	1,525	1,321	1,324	1,466	2,728	3,692	2,820	3,611	2,125	1,713	2,022	1,519	260
1945	YES	1,240	2,961	2,710	1,866	9,099	3,874	4,766	6,646	3,173	2,364	1,987	1,877	132
1946	YES	1,911	3,372	8,943	5,177	2,606	4,773	6,306	6,836	2,480	2,063	2,004	1,946	71
1947	NO	1,560	2,409	2,150	1,134	2,846	4,162	3,107	2,072	1,479	1,066	1,446	1,304	187
1948	YES	1,820	1,569	1,204	2,618	1,292	2,503	7,662	6,734	5,660	2,549	2,025	1,894	20
1949	YES	1,489	1,604	1,795	1,226	1,802	5,432	5,735	5,645	2,014	1,426	1,950	1,857	190
1950	YES	1,159	1,299	1,208	5,229	5,645	4,871	7,157	7,257	4,522	2,567	2,056	1,952	119
1951	YES	2,092	13,153	14,986	10,587	8,805	7,906	6,832	6,695	2,214	1,565	2,095	1,911	111
1952	YES	1,572	2,663	5,959	9,015	9,670	7,877	11,085	14,606	10,946	4,455	2,720	2,300	113

ATTACHMENT 1
FOLSOM RESERVOIR INFLOW (1922-1993) AND ATSP SCHEDULE

Water Year	Above Hodge	Folsom Reservoir Inflow (CFS)												ATSP SCHED
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
1953	YES	1,848	1,765	2,791	7,300	2,364	3,097	5,668	6,047	6,759	3,636	2,318	2,010	119
1954	NO	1,543	2,193	1,919	2,359	3,596	6,114	6,815	3,917	1,565	1,235	1,981	1,745	123
1955	NO	1,087	1,341	2,734	2,650	1,850	2,115	3,110	4,116	2,273	1,581	2,003	1,546	207
1956	YES	1,140	1,352	17,941	14,276	6,392	5,296	6,276	10,066	6,376	3,165	2,275	1,999	143
1957	YES	1,896	1,559	1,570	1,440	4,641	6,134	3,345	7,122	3,404	2,093	2,016	1,856	138
1958	YES	1,619	1,488	2,522	3,011	9,984	8,486	12,592	13,224	8,245	3,141	2,383	2,081	235
1959	NO	1,485	1,589	1,163	2,768	3,427	2,520	2,782	1,797	1,274	923	668	1,438	385
1960	NO	1,069	946	1,069	1,581	5,914	5,655	3,865	2,794	1,546	944	1,591	1,567	271
1961	NO	981	1,567	1,580	851	1,938	2,132	2,423	2,570	1,544	636	397	1,139	422
1962	YES	1,007	1,078	1,632	1,221	7,118	3,788	6,318	4,366	2,804	1,697	1,766	1,740	183
1963	YES	6,434	2,079	3,518	3,712	10,511	4,087	9,929	10,249	3,705	2,226	1,991	2,020	70
1964	NO	1,760	3,979	2,157	2,754	1,883	1,763	3,087	3,651	2,255	1,359	1,958	1,462	239
1965	YES	1,149	2,075	19,848	13,037	5,941	4,522	9,727	6,942	4,118	2,842	2,365	2,031	134
1966	NO	1,642	2,431	2,057	2,281	2,079	2,915	4,388	2,189	883	800	1,269	1,207	255
1967	YES	1,057	2,295	4,941	6,836	4,348	7,531	6,753	11,596	10,968	4,112	2,328	2,254	272
1968	NO	1,779	2,256	2,084	2,338	6,576	3,841	2,855	2,154	1,169	818	1,738	1,562	261
1969	YES	1,196	2,409	2,966	16,076	9,026	5,660	9,367	12,384	7,093	2,933	2,150	2,028	135
1970	YES	1,843	1,825	5,791	18,029	6,263	5,975	3,396	4,175	2,309	1,847	1,965	1,861	256
1971	YES	1,197	3,794	6,224	4,869	3,386	5,705	5,186	6,751	5,461	2,929	2,112	1,833	66
1972	NO	1,546	1,973	2,986	2,130	3,248	5,660	3,688	4,069	1,749	1,364	1,824	1,810	243
1973	YES	1,313	2,497	3,930	9,205	7,131	5,279	4,958	7,518	2,426	1,813	1,950	2,138	122
1974	YES	1,754	6,910	7,400	10,441	4,404	11,513	9,649	8,053	4,684	3,357	2,325	2,147	126
1975	YES	1,620	1,469	1,877	1,862	4,396	6,332	4,523	8,386	6,791	2,876	2,209	1,929	58
1976	NO	2,386	2,259	1,623	1,000	1,246	1,557	1,498	1,727	1,087	960	905	787	391
1977	NO	813	603	230	408	426	610	598	786	459	272	499	665	480
1978	YES	638	833	2,755	7,781	4,745	7,240	6,911	6,698	4,603	2,523	1,655	1,879	130
1979	YES	1,243	1,840	1,516	3,032	3,739	5,090	4,356	7,486	2,026	1,832	1,857	1,807	188
1980	YES	1,731	2,023	2,426	15,919	12,738	7,137	6,161	6,134	3,695	3,025	2,228	1,921	123
1981	NO	1,546	1,618	1,505	1,954	2,098	3,454	2,846	1,845	929	798	868	1,162	285
1982	YES	1,587	7,580	11,465	8,597	14,472	11,649	18,238	12,597	6,630	3,275	2,303	2,449	51
1983	YES	3,462	5,720	9,269	7,517	12,238	17,592	9,713	13,691	14,931	6,075	2,990	2,941	175
1984	YES	3,041	10,273	14,361	6,965	6,352	6,418	5,235	6,379	2,790	2,295	2,030	1,993	186

ATTACHMENT 1 FOLSOM RESERVOIR INFLOW (1922-1993) AND ATSP SCHEDULE														
Water Year	**Above Hodge**	**Folsom Reservoir Inflow (CFS)**												**ATSP SCHED**
		Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	
1985	NO	1,875	3,868	2,665	1,469	2,411	2,860	4,748	2,469	1,193	988	1,694	1,426	210
1986	YES	1,158	2,125	3,016	4,777	29,245	14,626	6,757	6,026	3,797	2,234	2,080	2,225	181
1987	NO	1,732	1,210	1,202	1,262	2,274	2,935	2,227	1,393	844	492	410	1,392	316
1988	NO	971	1,088	2,252	2,653	1,415	1,687	1,872	1,270	934	495	312	842	480
1989	YES	949	2,338	1,843	1,496	1,845	11,226	6,782	4,111	1,847	1,143	1,845	2,091	248
1990	NO	1,817	1,681	1,226	1,826	1,821	3,015	2,691	1,696	1,621	917	1,250	1,219	389
1991	NO	796	763	684	403	482	4,331	3,714	3,562	2,667	1,853	1,395	811	388
1992	NO	1,166	1,025	1,051	771	3,932	2,993	2,280	979	629	426	289	385	480
1993	YES	578	545	2,032	8,078	5,864	8,732	6,895	8,528	5,902	3,556	1,775	1,768	115